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JOURNAL  
OF THE  
ASIATIC SOCIETY OF BENGAL,

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VOL. XVI.

PART II.—JULY TO DECEMBER, 1847.

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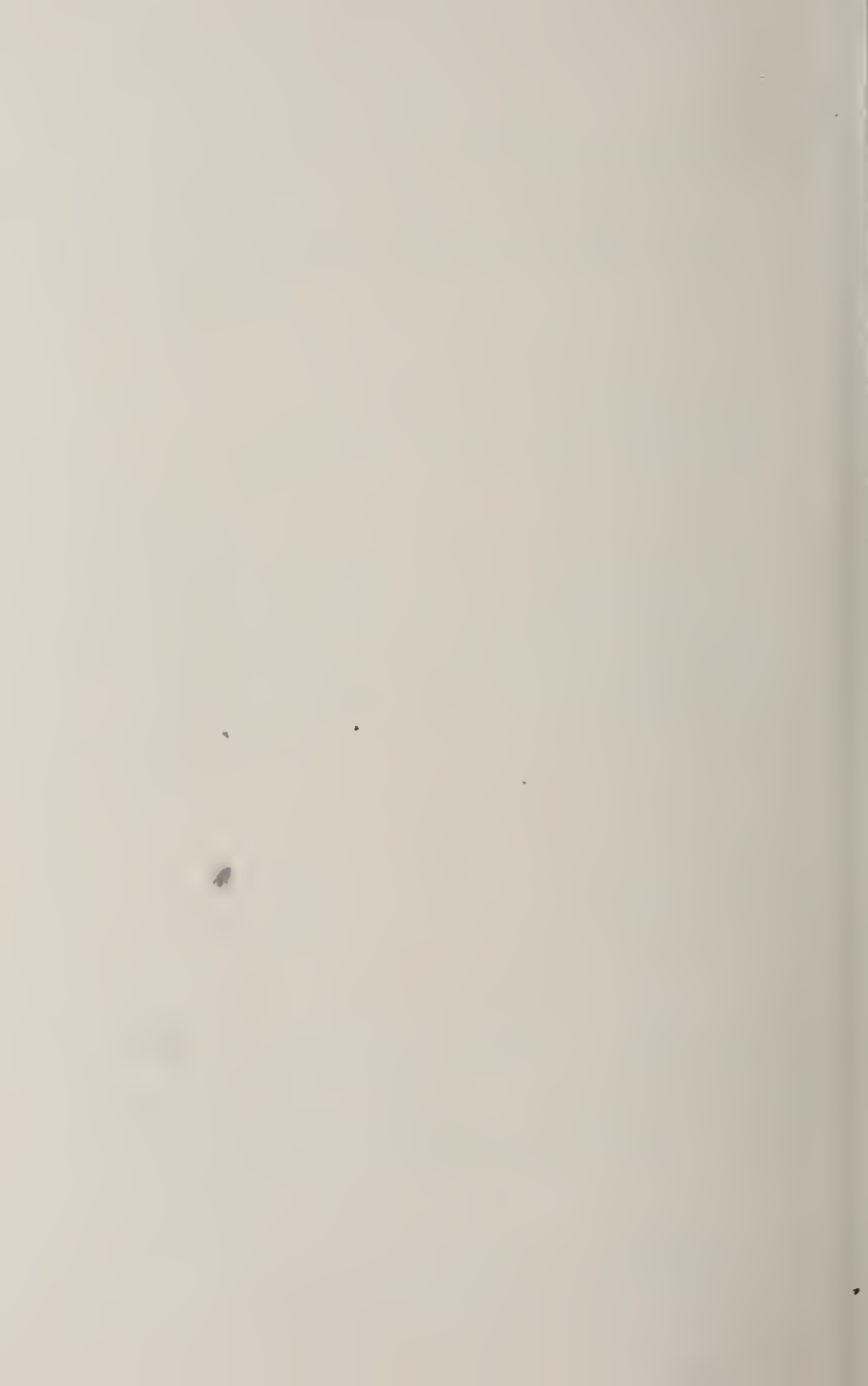
“It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science, in different parts of Asia will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish if such communications shall be long intermitted, and it will die away if they shall entirely cease.”—SIR WM. JONES.

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1847.





# JOURNAL

OF THE

# ASIATIC SOCIETY.

NOVEMBER, 1847.

*Report on the Timber Trees of Bengal,\* by Capt. MUNRO, F. L. S.*

I know of no better mode of supplying, as far as may be in my power, the information required relative to the timber trees of India, than by making a catalogue of the best of them, appending such remarks to each, as my own experience and reading may enable me to supply.

1. TEAK—*Tectona grandis*, Nat. Fam. *Verbenaceæ*. Generally known to the natives as *Saguan* or *Segoon*, although in central India two or three other trees are also called by the same name. The Teak when in flower is very pretty, and being so commonly cultivated nearly all over India, is known to most Europeans. Although it thrives to my own knowledge in almost every portion of Hindoostan, it attains perfection in a few favored localities only. The Teak forests of Malabar, are well known. They are very extensive, and produce according to experiment finer teak timber than any other forest. The trees generally grow in low hills of about 1 to 3000 feet elevation above the sea. Moulmein is also noted for its teak. I have seen large forests of the tree in Nagpore, and near the Nerbudda, the wood is very much used in that part of the country, and appears to be of a very superior description. In the Metcalfe Hall there is a very good specimen of Teak grown in the Botanical Gardens, which has been worked up into a table and presented to the Society, by the late Mr. Robison. From experiments carried on by Capt. Baker, and detailed in the 1st Volume of "Gleanings in Science," it would appear that Rangoon, Bombay, and

\* Drawn up by Capt. Munro, at the request of the Asiatic Society, for the information of the Military Board.

Pegue Teak were almost of the same strength, but are far surpassed by the Malabar Teak. Captain Baker's experiments, which will be constantly referred to, were carried on with specimens of wood two inches square and 6 feet long. In these trials the average weight, required to break the Malabar Teak, was 1070 lbs. whilst the other kinds broke with an average of 870 lbs. The extremes in these trials are very remarkable, indicating a very great difference in the value of different specimens of the same timber. The specimen from Rangoon, breaking with 654 lbs. and another from Malabar required 1162 lbs. Teak will not bend so much as Sál or Soondree, and breaks with about the same weight as Sál. It is therefore easy to determine for what purposes Teak is best adapted. It is used, as is well known, for an infinite number of purposes in India. The experiment made by Capt. Baker, differs much from the results of Major Campbell's experiment at Cossipore, as detailed in the Transactions of the Society of Arts. The Malabar specimen seems to have been a bad one, but as many of the other specimens were from unseasoned wood, they are not so much to be depended on.

2. GHUMBAR, GOMAR or GHUMBARRE—*Gmelina arborea*, Linn.—This belongs to the same natural family as the Teak, and is indeed very closely allied to that wood in appearance, with the grain rather closer, although much inferior in strength and elasticity. The best specimen broke with Capt. Baker, with 580 lbs. and the worst with 500. It is a common tree in most parts of India, generally found on hills about 2000 feet in height. It also grows in the Soonderbunds. The timber is supposed to resist water and worms better than Teak. As it will not bear much stress, it is commonly used for light work, such as the cylinders of drums, carriage panels, decks of budgerows, and turnery. Although more durable than many woods, and not subject to warping, it can scarcely be called a valuable timber, and from its resemblance to Teak, might be used in mistake for that wood, where serious consequences would ensue.

3. DHAMUM or DANGAN.—This was discovered by Mr. Griffith to be an undescribed species, and was called by him *Hemigymnia macleodii*. Of the same order with the Teak, it is very dissimilar in its great elasticity. I am not aware of any other locality for its growth than the forest about Seonie, between Jubbulpore and Kamptee. The tree has a peculiar appearance, and can be distinguished at a long dis-

tance in the jungle. I have seen excellent fishing rods made out of it, and good-sized timber could be at times procured. I believe the timber to be excellent, but, as according to our present information, it grows at such a long distance from water carriage, except by the Nerbudda, it cannot be looked upon as likely to be of much consequence in commerce. I imagine from observation the tree to be of slow growth, and that it would require 30 years to come to perfection, if it should be thought desirable to encourage its cultivation on the low hills which approach the Ganges. There is no good specimen of the wood in the collection of the Horticultural Society, and it would be very desirable to procure one.

4. and 5. There are two other woods of this family produced in Goalpara, CHIKAGHUMBAREE,—*Premna hircina*, and BUKDIOLI, *Premna flavesceus*,—which from Mr. Kyd's experiments would appear to be very durable woods, but are not I believe, possessed of any other valuable properties.

6. SÁL—*Fateria robusta*, W. and A.—*Shorea robusta*, Roxb.—N. P. *Dipterocarpeæ*.—I believe I am right in saying that every tree belonging to this family is a valuable one, most probably, from all containing a considerable quantity of a resinous juice, which is called in the various trees, *Dammar*, *Wood-oil*, *Gum Anime*, *Piney varnish*, *Ral*, *Dhoona*, &c. These trees are all fine ones, and in the forests of Malabar attain a stupendous height. In the Ghauts of Cong and the Neelgherries one kind is generally known to Europeans as the Buttress tree, and from growing within a short distance of the sea, with water carriage from the foot of the mountains by the Calicut River, thus offers a supply of the most valuable timber for some time to come. The Sál itself is probably the best timber in India. Of 10 experiments of Capt. Baker, the mean weight required to break the wood was 1238 lbs., and one specimen required 1304. The tree is found in great abundance in the Murnug forests and in the whole belt of forest at the foot of the Himalayas, frequently growing, as the Teak does, over a great extent of ground unaccompanied by any other tree. The Calcutta market is abundantly supplied with the timber, principally I believe from Gorrukpore. It is undoubtedly a very valuable wood for house building, and for many parts of gun carriages, and indeed for almost all purposes on shore, where very strong tough wood is required. It is heavy, the specific gravity

being upwards of 1,000, whilst Teak is about 720. The Camphor tree of Sumatra is closely allied to the Sál. Two species of *Dipterocarpus* (of the same family) under the native names of MEKAI and HOO-LUNG, are mentioned by Capt. Hannay and Mr. Masters, as producing fine timber in Assam.

7. TOON—*Cedrela toona*, Roxb. This, with the Mahogany, Satin wood, Rohunna and Chittagong wood, all belong to the same natural family, *Cedrelaceæ*, affording very valuable timber. The Toou is a favorite wood with the carpenters of India, and works out very prettily; the tree has a wide range in the Peninsula of India, and generally throughout Nagpore, Bundlekund and the lower ranges of the Himalayas. It is a very beautiful tree, and now adorns the sides of roads in every part of Bengal, particularly at Bhaugulpore and Monghyr. 800 lbs. broke the specimen used in Capt. Baker's trials, and its specific gravity is 640. Captain Hannay describes three varieties of Toou in Assam, under the names of Hindooree Poma, and Seekha Poma, and says that although light, when once seasoned, it is very durable, and some splendid boats are formed of it, particularly in the Dihong river where it would seem to be in great abundance. It is mentioned by Lieut. Nuthall as one of the woods of Arracan, under the name of Thit-ka-do.

8. MAHOGANY—*Swietenia mahogani*, Linn.—This of course is only known in India in its cultivated state, and sufficient has been done to show that it can be grown with great success. The Horticultural Society are in possession of beautiful specimens that have been worked up from trees grown in the Botanical Gardens, and which are supposed to have been 43 to 44 years old, when felled. The cultivation of the tree ought to be encouraged as much as possible in the lower hills, for even in its native country the quality depends very much on the situation where the trees grow. On elevated rocky places, where there is but little soil, the wood is always of a better grain and superior texture, whereas in low alluvial situations, however vigorous and luxuriant the plant may be, the quality of the timber is always inferior, more light and porous, and of a paler color. Mahogany is said to be almost indestructible by worms or in water, and to be bullet-proof. Capt. Franklin took with him to the polar seas boats of Mahogany as being the lightest in consequence of the thinness of the planks, combined with great strength.

9. **ROHUNAH** or **ROOAH**—*Soymda* (*Swietenia*) *febrifuga*, Roxb. It is also called *Kukhut Rohida* in the Nagpore jungles. I am not aware that this tree is found in Bengal, but it is very abundant in Nagpore, and also in southern India. I have had at Kamptee abundant opportunities of trying the strength and value of the timber, and believe it to be one of the best in India. It takes a high polish, and from its fine red color is peculiarly adapted for furniture. There are specimens in the collection of the Horticultural Society, of the wood sent from the Jungle Mehals.

10. **CHICKRASSEE** or **CHITTAGONG WOOD**—*Chickrassia tabularis*, C. I. This wood appears to be very abundant in Chittagong and in southern India, but I am not aware that it is applied to any other purpose than cabinet making, for which it is admirably adapted. According to Mr. Masters, this tree is known in Assam by the same native name as the Toon, namely Toona.

11. **BILLOO**—*Chloroxylon swietenia*—The satin wood. It is generally found in company with the *Rohunna*. It is however much rarer, but is deserving of greater attention than has been yet paid to it.

12. **SOONDREE**—*Heritiera minor*.—This tree, which furnishes a great portion of the firewood of Calcutta, belongs to the natural family of *Sterculiaceæ*, in which almost all the woods are very perishable, and indeed in one tree, the *Adansonia*, which far surpasses in size any that we are acquainted with, the wood perishes into dust within 12 months of the felling of the tree. However, the Soondree, from Capt. Baker's experiment, appears to be the strongest and toughest wood he tested. The mean of five experiments gave 1312 lbs. for breaking. The specific gravity is much the same as Sál, 1030. Soondree is very generally used in Calcutta for buggy shafts, and is well adopted for all temporary purposes where strength and elasticity are required. It is also used for boats, boat masts, poles and spokes of wheels. I imagine the Soonderbunds derive their name from this tree.

13. **SISOO**—*Dalbergia sissoo*, Roxb.—This, with *Dalbergia latifolia*, *Sitsál* or Black wood; and *Dalbergia emarginata* or *Andaman Sissoo*, all belonging to the same genus, composes a portion of the natural family *Leguminosæ*, notorious for its timber trees, some of which in America, according to Martius, attain the gigantic size of being at the bottom 84 feet in circumference, and 60 feet where the tree becomes



cylindrical. If Sissoo was a more durable wood than it is supposed to be, it would be the most valuable wood in the country. It is very strong, requiring a mean of 1102 lbs. to break it, is very elastic, and has a specific gravity nearly the same as teak, 724. The timber is seldom straight, and is therefore not well adapted for beams, but is much employed for furniture, ship building and other purposes, where curved timber is required. It is not proof against white ants. The tree is found all over this Presidency either cultivated or in its native jungles, but is rare in southern India. *Kunkur* appears to be prejudicial to it, for in the neighbourhood of Agra, as soon as the roots reach the *Kunkur*, the tree which up to the time had been quite healthy, suddenly dies off. The Calcutta climate seems to agree very well with the Sissoo, as there are some magnificent trees in the neighbourhood.

14. SIT SAUL—*Dalbergia latifolia*.—This is called Black wood and Rose wood, and sometimes when well worked is fully equal to the finest description of the Rose wood of commerce. The tree attains a larger size in southern India than it does in these provinces, and the wood is more commonly used there. The tree is common in central India and also, I believe, in Assam. I imagine the “black rose wood” mentioned by Capt. Baker to be this wood, and if so, its specific gravity is 875, and it required 1196 lbs. to break it. It is a remarkable fact that up to this date it has not been ascertained to what tree we are indebted for the “Rose wood” of commerce.

15. PEET SAL—*Pterocarpus marsupium*. This with *P. santalinus*, red sandal wood, and *P. dalbergioides*, Andaman red wood, are those magnificent timber trees of which very fine specimens are to be seen in the Botanical gardens, and also in the Barrackpore Park. The most prettily shaped tree in the Park is *P. marsupium*. *P. dalbergioides* flowers in the gardens in July and August, and spreads its delicious fragrance from a long distance round. One tree is a most superb one, out-topping nearly every tree in the garden. The two other species are abundant in the jungles of central and southern India. *P. marsupium* is believed to produce a variety of the Gum Kino. It is universally known in central India as the Hyissar, and is a very strong, tough and durable wood, perfectly impervious to insects of any kind. From its waved grain it makes very handsome furniture. Its good

properties seem to be valued by the natives of Nagpore only. There is no specimen of the wood that I know of in Calcutta, but it can of course be easily obtained. I have made very numerous trials of this wood and am of opinion, that it is the best wood in India, combining as it does strength, lightness and beauty, and it is easily procurable of very large dimensions. I have seen it very generally used for door and window frames, but it is curious to observe that the plaster in its proximity always becomes more or less stained with a red colour. The finest trees I observed in their native jungles, always grow in the stony bed of nullahs, a favorite locality of many leguminous trees.

16. SERISS—*Acacia serissa*. This genus also contains *A. arabica*, BABUL, and *A. catechu*, KAIRA, producing timber. The Seriss is a dark coloured very hard wood, approaching Sissoo in appearance and properties, but with the advantage of not being so liable to injury from insects. It is heavier than Sissoo and broke with 709 lbs. and is not quite so elastic. It is a fine handsome tree, and to be found all over India growing in the plains. The wood is principally adapted for furniture.

17. BABUL—*Acacia arabica*. This is a very useful, strong, tough timber, used for knees and crooked timbers in ship building, for the axles of country carts, handles of mallets and various agricultural implements, and indeed for all purposes where very tough small plain wood is required. If it attained to any size, it would be extremely valuable. The tree grows well in every soil and is well known to every person who has travelled in India.

18. KHERI, KAIR, KAIRA, KOROI—*Acacia catechu*.—This tree is known, wherever I have been in India, by some slight variation of the words I have given above. It is more valuable than is generally supposed, and when a large tree can be obtained without much of the outer light coloured wood, it is an excellent timber. It is very hard and turns very well, being quite as close in grain as box, kingwood, and other fancy woods which command a very ready and remunerative sale in England. The tree is very widely spread over India, and seems to grow well even in the poorest soils. The timber described as *Kerdun*, or *Keerra* from Chota Nagpore, and so favourably reported on by Major Goodwyn, most probably is the same. Capt. Tickell, in forwarding the specimens, says:—"It works easily and smoothly, does not chip or

crack by the weather, and the grain is so fine that the smallest work with the highest polish could be done in it."

19. KENDOO—*Ebony*. There are several kinds of Ebony in India ; in fact there is no part that does not contain at least two or three different species of *Diospyros*, all of which produce more or less black wood, but *D. melanoxylon* is superior to any other. I imagine there is no wood more durable than Ebony, and no insect can do it any harm. I refer only to the heart of the tree ; the outside wood which composes the largest parts of many trees, is attacked immediately by all kinds of insects. In central India, where the Ebony grows to a large size and is very commonly used for beams in houses, a large tree is cut down, and left for a year, when it will be found with all the light coloured wood eaten away, and the hard and durable Ebony alone left ; carpenters are very loath to use the wood, as it injures their tools very much, and with many the fine particles which come off in the working, cause intolerable sneezing. Every one is aware of the beauty of Ebony if well polished, but few perhaps imagine that it is to be procured in such abundance as it is. It is to be found in every jungle of India.

ABLOOYA, KYAN, GAB, OORIGAB—Are all well known native names for different species of good useful Ebony. All these trees are species in the neighbourhood of Calcutta, and some very fine trees of the Kyan, *Diospyros tomentosa*, occur at Allipore. The Gáb is known and used as a paying substance for boats by all natives—and it will very probably be found that *Gutta Percha*, which in time must become one of the most valuable exports from the straits of Malacca, is a species of *Diospyrus*.

20. JAROOL—*Lagerströmia*. This is the pretty tree that so ornaments most of our woods with its beautiful light purple flower in June. There appears to be very various opinions regarding the merits of the wood as such, which while one variety is strongly recommended, another is equally strongly condemned. It is therefore necessary to be very cautious in using it. Capt. Baker writes of red Jarool as a fine wood growing to a great size in Chittagong, but brought to the Calcutta market too small to be of much use except for picture frames and other similar purposes. The Chittagong forests are said to be nearly cleared of the best, a thorny species of Jarool,—the others are of little value. It



is considered a valuable wood in ship building. Hamilton describes it as growing of 6 feet girth in Goalpara, much used in building, but soft. Capt. Hannay, in describing the wood in Assam, says it is well known at Dacca and is admirably adapted for that portion of boats under water; well seasoned, it is a good wood. The Jarool is very scarce. I have seen the tree growing to a great size in the forest of Malabar, where it is not much esteemed.

21. ASSAM—*Terminalia tomentosa*. W. and A.,—Arjun, Arjuna, W. and A.—*T. bellerica*, *T. calappa*, &c. &c. are all light coloured tough useful timber, not very ornamental, but often for their great size very useful. Hari is a common name of the different species amongst natives. They are to be found all over India, and generally valued where they grow. Roxburgh mentions one species as growing to such a size as to be made into solid wheels for Buffalo carts. The Assams were found by Capt. Baker to surpass every other tree in elasticity,—to break with 903 lbs. with specific gravity of 986. Capt. Hannay speaks in the highest terms of two species, but he describes the wood as very light, whereas from the specific gravity mentioned above, it is evidently a very heavy wood;—he says the wood has the quality of standing the weather well, and kept constantly in water, to harden and get black coloured. It appears to me admirably adapted for oars and ship's spars.

The above are, I believe, the most valuable timber trees in Bengal, and the number is indeed a large one, to which I could have added as many more nearly as good, plainly showing that there is no country in the world to surpass this in its timber produce. I regret much that my approaching departure for England renders it impossible for me to make this list as complete as I could have wished. The subject is a deeply interesting one, and having paid great attention to it in India, I hoped some little advantage may have been derived from my observations. There are several trees no doubt possessed of equally valuable properties, but they are only known by uncertain native names. I would respectfully suggest that Government be requested to direct their officers located in favourable positions to send in leaves, flowers and fruit of the trees reputed in their neighbourhood to be useful for timber. As it may be seen above that peeniar uses seem to run in the same natural family, a botanist could in every case indicate the probable value of the timber. I would

observe that it is a well known fact, that wood grown in hilly countries is far superior to that grown in the deep soil of the plains. The trees are longer in coming to perfection, and mature their juices more slowly and solidly. This is particularly exemplified in the Sandal wood, which never is possessed in the plain of the good rich scent that it has when growing in the hills of Mysore, about 2000 feet above the sea. The Cedar of Lebanon also, which I believe to be identical with *Cedrus deodard* of the Himalayas, is almost valueless as a timber tree, unless grown in rocky stony places, where there is but little soil. It is very remarkable to observe the difference of the quality of the Deodar wood which is grown on the south side of the snowy range from that produced in Kunawur on the precipitous sides of the Sutledge. Another remark I would particularly call attention to, is the felling of timber at the proper season when the sap is at rest. It requires no botanist to point out when this is to be done, as although the leaves do not fall off in India, as in more temperate climates, it is impossible to find any difficulty in deciding from the appearance of the tree, when the time for felling has arrived. When the sap is rising, the leaves are generally somewhat soft and perfect. When it is at rest, the leaves are harder, and in India almost always corroded by insects. In consequence of the facility of barking a tree when the sap is rising, oaks are often felled at this season in England, always with disadvantage to the timber, and this same facility of barking may also be an inducement to others in this country to fell timber at improper periods of the year.

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*Report on a Passage made on the Nurbudda River, from the Falls of Dhuree to Mundlaisir, by Lieut. KEATINGE, and of a similar passage from Mundlaisir to Baroach, by Lieut. EVANS. (Communicated by the Government of the N. W. Provinces.)*

No. 753 of 1847.

*From J. THORNTON, Esquire, Secretary to Government N. W. P., To the Secretary to the Asiatic Society, Calcutta, dated Head Quarters, the 4th October, 1847.*

SIR,—I am directed by the Hon'ble the Lieutenant Governor N. W. Provinces, to forward to you for submission to the Asiatic Society, the

accompanying copy of a report by Lieut. Keatinge, of a passage made by him during the last rainy season on the Nurbudda river, from the falls of Dharee to Mundlaisir, and also copy of a report by Lieutenant Evans, of a similar passage at the same season, from Mundlaisir to Baroach.

2. The Lieutenant Governor considers that these papers might be advantageously printed in the Society's Journal in continuation of Mr. Shakespear's note on the Nurbudda river.

I have the honor to be, Sir,

Your obedient humble Servant,

*Head Quarters,*

J. THORNTON,

*the 4th October, 1847.*

*Secretary to Govt. N. W. P.*

Copy.

*From Lieut. R. H. KEATINGE, Asst. to the Poll. Agent, Nimar.*

*To Captain P. T. FRENCH, Poll. Asst. in Nimar, dated Mundlaisur,  
6th August, 1847.*

SIR,—I have the honor to inform you that according to your suggestions I left Mundlaisur on the 29th of July, and proceeded towards Dawree, to see if a road could be made along either bank of the Nurbudda, so as to circumvent the falls opposite that place.

2nd. Leaving Burwac, on the 30th of July, I proceeded to Seylanee, a distance of 14 miles, by the road lately cleared; about 6 miles from Burwae, the jungle becomes a forest, and continues so to Dawree, which is 18 miles from Seylanee.

3rd. During the whole of the day, as I rode through the forest, I was surprized to see large and old timber left uncut within a mile of the river, but on enquiry was informed that it was impossible to transport any but the smallest sized trees, even that short distance, owing to the absence of tolerably clear paths.

4th. Bamboos, however, are cut in great numbers, and brought to the falls, where the Gonds, who carry them there, exchange them for grain with speculators from Mundlaisur and Melhasur.

5th. On the upper or Eastern side of the falls of Dawree, the rock slopes into the river at an angle of from 1 to 2 degrees, and is so

smooth and level that in most places a cart could even now be driven over it; below the fall, however, the rock ends in abrupt and irregular steps of from 10 to 50 feet, and during the three days I spent at Dawree, I looked in vain for a place where a road could be made without considerable expense, to slope down to the water's edge.

6th. Within half a mile of the village there is a perpendicular rock 51 feet high, under which boats could come at all seasons, and if a crane were placed on the top of it, goods of every description and even light boats, could, without the least difficulty, be drawn up and let down. From thence to the navigable part of the river above the falls is only a distance of 1490 yards, which could be made fit for carts at the cost of 4 or 500 Rs.

7th. Timber, both large and of a good description (ungun) grows on the spot, so that no difficulty exists to large and powerful (though doubtless rough) cranes and windlasses being constructed on the rock where they are to be used.

8th. Many of those who now go up the Nerbudda for the purpose of buying or cutting wood, leave their boats at Dawree, whilst others with great labour drag them (if light enough) over the rocks, but for this many men are required; all these are of the poorest of these poor provinces, and unaided will never be able to afford the expense of in any way surmounting the difficulties of the river at Dawree; but I feel convinced that were such a measure undertaken, we should see a trade spring up between this and the Hoosungabad Provinces.

9th. Several natives with whom I conversed had been up the river as far as Chund-ghur, the site of the great Iron mines, 12 coss above Dawree, and report the stream quite as clear as below.

10th. On the 3rd of August, at 12 o'clock, I left Dawree in a boat with six boatmen, about the same number of attendants, and a good load of baggage, and arrived at Oonkur, a distance of 20 miles, at 5 P. M., without meeting any obstacles or delay.

11th. On the 4th of August, I left Oonkur at 5 A. M. and arrived at Mundlaisur (20 miles) at 6 P. M., having stopped an hour on the way; our progress this day was much impeded by a smart westerly wind, but the river presented no sort of difficulty.

12th. During the rains of 1845 I went by the river from Mundlaisur to Oonkur and back, and in March, 1846, I proceeded from

Oonkur to Dawree and back again, the stream being at that time very low, but on neither occasion did I meet with any obstruction.

I have, &c.

(Signed) R. H. KEATINGE, *Lieut.*

*Assist. to the Poll. Agent in Nimar.*

P. S.—I have the honor to enclose a section of the proposed road along the northern bank of the river at the falls.

(True Copy.)

(Signed) W. F. EDEN,

*1st Asst. to the Resident.*

Copy.

*Report of Voyage down the Nurbudda from Mundlaisur to Baroach,  
in the month of July, 1847.*

I left Mundlaisur on the morning of the 22nd July, 1847. Having two boats, one the common ferry boat, flat-bottomed, wall-sided; about 30 feet long and  $2\frac{1}{2}$  high, requiring 4 men to manage, and capable of carrying 6 marries pukka; (2880 lbs.,) and the other consisting of 3 canoes, lashed together with a platform of bamboos upon them. This latter I took, having some doubt as to the possibility of getting a large boat down the Hirn Phal rapids, remembering what Captain Anderson had done (vide his report) and intending, in case of extreme difficulty, to unlash the canoes, and carry them round the rapids, launching them again below. The result, however, will show that the flat bottomed are the boats best of all calculated in all seasons for this navigation.

2nd. We reached Chiculda on the 24th, a distance, I suppose, of nearly 60 miles. The only obstruction, below Mundlaisur to this point, is the Suheshur Dharrah. This has been so well described by Captain Anderson, that I need not enlarge upon it. It can either be got over by a road along the southern bank, or by, as he proposes, deepening the backwater. Should the former, for reasons hereafter given, be preferred, the accompanying plan drawn by Lieutenant Keatinge, of the Bombay Artillery, Assistant at Mundlaisur, who has kindly levelled and surveyed this spot, will show the road proposed, a distance of about 1200 yards in all.

3rd. I left Chiculda on the 25th, and reached the Hirn Phal at 12 of noon. This distance, about 16 or 17 miles by the map, is perfectly



clear, and free of obstructions. Captain Anderson calls it 25 miles, but I think this is a misprint for 15. The river, when I reached the Hirn Phal, had risen about 18 feet above hot weather height.\* I had often before been at the place, and was therefore enabled to estimate the height with tolerable accuracy. Like Captain Anderson, I experienced very little difficulty in descending this rapid, for it is nothing more,—but it is the Boorkherry rapid, one mile below, that offers the chief obstruction. This Captain Anderson mistakes for the Hirn Phal, whereas the first place goes under that name. The Boorkherry rapid I succeeded in getting my boats down with some difficulty, by the southern channel, but a road, I am inclined to think, would be the best mode of overcoming this obstacle; as when the river is low the length of the rapid would increase the difficulty considerably. The immense height to which the river rises in the monsoon, sometimes 70 feet above hot weather height, would be a serious objection to a lock or locks; but on this point I am not competent to speak.

4th. About two miles lower down (or even less) is another place called the Gunnee Ghat, the features of which are precisely similar to the Boorkherry rapid. Here, however, the fall being inconsiderable, it would be necessary only to clear away the detached fragments of rocks in the bed of the channel, to render it perfectly passible. From hence to Beytala, 20 miles, a Bheelala village on the north bank, 4 miles below the Hutnee river, the river is clear and deep, and the voyage offered no difficulty.

5th. The hills on either side from Dhurmrai, above the Hirn Phal, to Beytala, rise to a good height, and are covered with jungle. Inhabitants are very scanty. Dhurmrai is inhabited by a few Bheels, under Kaloo Sing Bheelala. On the north bank, 10 miles lower down, is the large Bheel hamlet of Dussana, the people of which were formerly notorious for their predatory habits, but they are now peaceable enough; 6 or 7 miles beyond this, about one mile inland, from the mouth of the Hutnee, is Kukrana, a Bheelala village, in the Rajpooor district; and two miles lower down, on the south bank, is Bhudul, a

\* The boats were let down by ropes attached to the stern by a channel in the middle of the belt of rocks, the said channel being a rocky slope in which the water was some 2 feet deep. In the fair weather when the river is low, boats go by the backwater channel.

Bheel village, the residence formerly of the notorious freebooter Bamun Naik, now held by his son, a peaceable reformed character.

6th. To Kukrana, Captain Anderson penetrated, and it was the fear of Bamun Naik, then openly in arms, that caused his boatmen to refuse to advance.

7th. At Beytala is an obstruction very much resembling the Suleshur Dharrah. It is a belt of rocks stretching diagonally across the river. From the middle to the north bank, the rocks are perpendicular, except in one narrow channel near the bank, but towards the south bank, they are worn away, and I found little difficulty in letting my boats down, guiding them by ropes attached to the stern. There may however be more trouble in doing so in the dry season;—when I passed, the river was fully 20 feet above hot weather mark.

8th. Below this again is a very bad rapid, about  $\frac{1}{2}$  mile from Beytala. I tracked my boats down near the northern bank, but am inclined to think that there is deeper water in the middle of the river, merely obstructed by some large rocks, which just showed their heads above water, at the bottom of the rapid, and caused such a sheet of broken water, that I dared not trust my boats within it.

9th. From about 5 miles below this, the hills rise to a much greater height, the scenery is magnificent, and the river deep, very rapid, and free from material obstructions. Both banks are studded with Bheelala villages, but the jungle is very dense around their little patches of cultivation. The rocks, forming the banks, are high, in many parts almost perpendicular; the stream has a current of about 6 miles an hour. From Bhadul the southern bank is Akranee, a portion of Khandeish, and the northern from the Hutnee is Mutwar, a Bheelala Thakoorship.

10th. To Haump, 25 miles, the features of the river are the same, lofty hills, scarped rocky banks, deep channel, here and there rapids of no consequence, and a strong current. Haump belongs to the Rajá of Oodeypore, a feudatory, I believe, of the Gnicowar, and is merely a temple, there being no village; here the river narrows still more, and about 2 miles below commences a series of rapids, known as the “Balu Gori,” of the difficulties of which I heard much. It continues about 4 miles; the river much confined rushes rapidly between high rocks; and with ordinary care in a large boat there is no danger.

But with the raft, the waves washing in filled the canoes, and swamped them, and we had to swim for it. Whereas the flat bottomed boat passed without trouble; nevertheless, it is a place that would always require care, yet, as it become known, I have little doubt it would be scarcely thought of.

11th. As far as Soolpan, 27 miles from Haump, the river is, as I have described it. About 6 miles below Soolpan are the Mookree falls. These being always mentioned as nearly, if not totally insurmountable, I examined carefully. The river at its ordinary rainy height, about 25 feet above hot weather mark, covers the rapids entirely, and we shot past them with little trouble. But when the river is low, there is a fall of 8 or 10 feet. Now all the people spoke of the existence of a backwater, by which, as at the Suheshur Dharrah, I can conceive no obstacle to boats passing either up or down. Moreover, from my own inquiries, and as mentioned by Lieut. Elwan, of the Hon. Company's Marine (vide his report) it seems that small boats do actually now ascend, and carry Kupra-kerana, and salt to Haump, whence they return with timber. Lieut. Elwan says that toonies drawing 3 feet water go up, but my informants only spoke of canoes, which draw when loaded 6 inches. However, all whom I conversed with agreed that nothing exists to prevent large boats from going up. With Mokree end the hills and therefore the difficulties, from thence to Telluckwara, about 20 miles, is plain sailing, and below that boats of large size come up constantly.

12th. On carefully considering the character of the river, I may, I think, venture an opinion that it would take very little to render it navigable, in the following manner; although I should like to see it as well in the fair season, when it is low, so as to leave no room for doubt, as during my voyage it was swollen.

13th. At the Suheshur Dharra, the Hirn Phal, and Mokree, perhaps also at the Beytala Ghat, a road along the bank might be formed, for which the nature of the bank offers great facilities. There would be objections to the plan chiefly on account of the trouble and delay of unloading and reloading above and below; but when the difference of expense between a road and locks is considered, I think the former will be considered preferable. Moreover, by it the boatmen on the river would only have to work in their respective districts. The Bur-



wace, Mundlaisur, and Mhyshwur men would work between the Suhe-shur Dharra and the Dharree falls (above Oonkar, Maundata) the Ack-burpore, Durrampore, and Chukuldah men would carry on to the Hirn Phal. From thence another stage (or two) would bring to Mokree, below which the Tilluckwara boatmen come into play. At present there are no regular boatmen between Hirn Phal and Mokree (about 80 miles), the canoes that come up to Haump, being brought by fishermen and others incompetent to manage a larger boat.

14th. The Map, accompanying Mr. Shakespear's resumé of reports upon the river, is, generally speaking, very accurate. There are a few inaccuracies between Hirn Phal and Haump, but of no consequence. I regret that when my canoes were swamped at the Balagori rapids, my papers containing the bearings of the river in that part, were washed away.

15th. I may add that the difficulties to be surmounted seem to me to have been very much exaggerated. Such was also the opinion of my friend and brother-officer Captain Anderson, and I feel great pleasure in having followed where he had led the way. He was the first to descend the Hirn Phal; it was when the river was low, in March, and he felt confident, as do I, that the obstructions below the Hutnee river beyond which his boatmen's fears prevented his proceeding, were no more insurmountable, even at that season, than those above the Hirn Phal, for instance, which until his time was considered perfectly impassable for even empty boats.

16th. I have navigated the river above Mundlaisur for 60 miles, to the Darree falls, to which place it is perfectly passable, and boats constantly go up. At Darree, a road would also be required—above Darree, the falls of Mundhur are spoken of as bad, but the report is by a native, and I have no doubt it is by no means worse than those below. Indeed, the present Colonel Ousely, when formerly at Hoosungabad, states that from his inquiries he is convinced that Mundhur can be cleared. We should then have communication from Hoosungabad, near which the coal is found, to the sea. Coal, grain, linseed, and many other articles of the produce of central India, amongst which, not the least considerable, would be opium, would pass down; and from October, goods, cloth, spices, cocoanuts and Europe articles, supplies, could come up. The places where roads would be required would be trifling, and in the

rains, the time when coal could be sent down, even that would be diminished.

1st Stage—Hoosungabad to Dharree, about 100 miles.

2nd. Do. Dharree to Suheshur-Dharra, 70 miles.

3rd. Do. Suheshur-Dharra to Hirn Phal, 67 miles.

4th. Hirn Phal to Beytala Ghat, 20 miles. I am by no means certain that a road would be requisite at Beytalla.

5th. Do. Beytala Ghat to Mookree, 60 miles.

6th. Do. Mookree to Baroach, about 80 miles.

17th. I arrived at Baroach on the 1st August, having accomplished the whole distance from Mundlairsur in 11 days, during which I was 102½ hours actually under way. The distance between Dhurmrai, above Hirn Phal, and Mookree, about 80 miles, occupied 21½ hours only, although spread over nearly 5 days.

18th. The various reports referred to in this memorandum, Colonel Ousely's, Captain Anderson's, and Lieutenant Elwan's, I have quoted from a resumé made by Mr. A. Shakespear, Assistant Secretary to Government, North Western Provinces, entitled "Notes on the Navigation of the Nerbudda," and which with the map accompanying, require to be referred to, to render this intelligible.

I have, &c.

(Signed) H. L. EVANS,  
*Deputy Bheel Agent.*

True Copy,

(Signed) W. F. EDEN,  
*1st Asst. Resident.*

True Copies,  
H. TUCKER,  
*Offg. Asst. Secy. to Govt. N. W. P.*

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*On the Cat-toed Subplantigrades of the sub-Himalayas.**By B. H. HODGSON, Esq.*

Amongst the very numerous mammals of these regions (135 species) the most interesting and least understood group is that I have denominated after Colonel Smith, the Cat-toed Subplantigrades, and to those who are still disposed to assert that the *filum areadneum* of natural classification can be traced by poring, how sedulously soever, over dry skins and drier bones, I recommend half an hour's consideration of the present group. All is chaos in recent systems with regard to the relations and position of these animals, which are represented in the sub-Himalayas by the Wáhs or Pandas, and by the Screwtails, and constitute respectively the genera *Ailurus* and *Paradoxurus* of Cuvier, to which Colonel Smith adds *Galidietis* (*Galietis* of Geoff.) I cannot pretend to remove this cimmerian darkness because it results from want of adequate information relative to the general structure, habits and economy, not merely of the species composing these two (or three) genera, but also of those constituting nearly all of the proximate forms. At least I do not find any adequate account of the majority of them, and I do find the greatest differences of opinion as to their true characters and relations prevailing among our most recent guides in zoology, such as Colonel Smith,\* Mr. Gray,† and Mr. Waterhouse,‡ of whom the first upholds and attempts to carry out Cuvier's locomotive principle of subdivision, whilst the two latter entirely reject it. Cuvier knew little of the Wáhs or of the Screwtails. He defined or rather indicated the Genera late in his career from imperfect specimens transmitted immediately after their arrival in the East by Vaucel and Diard, gentlemen whom the Jardin des Plantes sent out to glean that harvest which English perverseness could not or would not take any sensible or intelligible steps to glean.§ I myself assisted Du Vaucel's researches

\* Nat. Library, XIII. 155—174 and 190—224.

† Zool. Journal, Oct. 1836 and Catal. Brit. Mus. 1843.

‡ Zool. Journal, August 1839.

§ These steps can be but two, 1st sending out travelling naturalists, 2nd and far better, establishing concert with local residents: and that the Zoological Society with a revenue of 12,000£ per annum has yet taken neither, is a strong proof of radical defect in the proceedings of that Society.

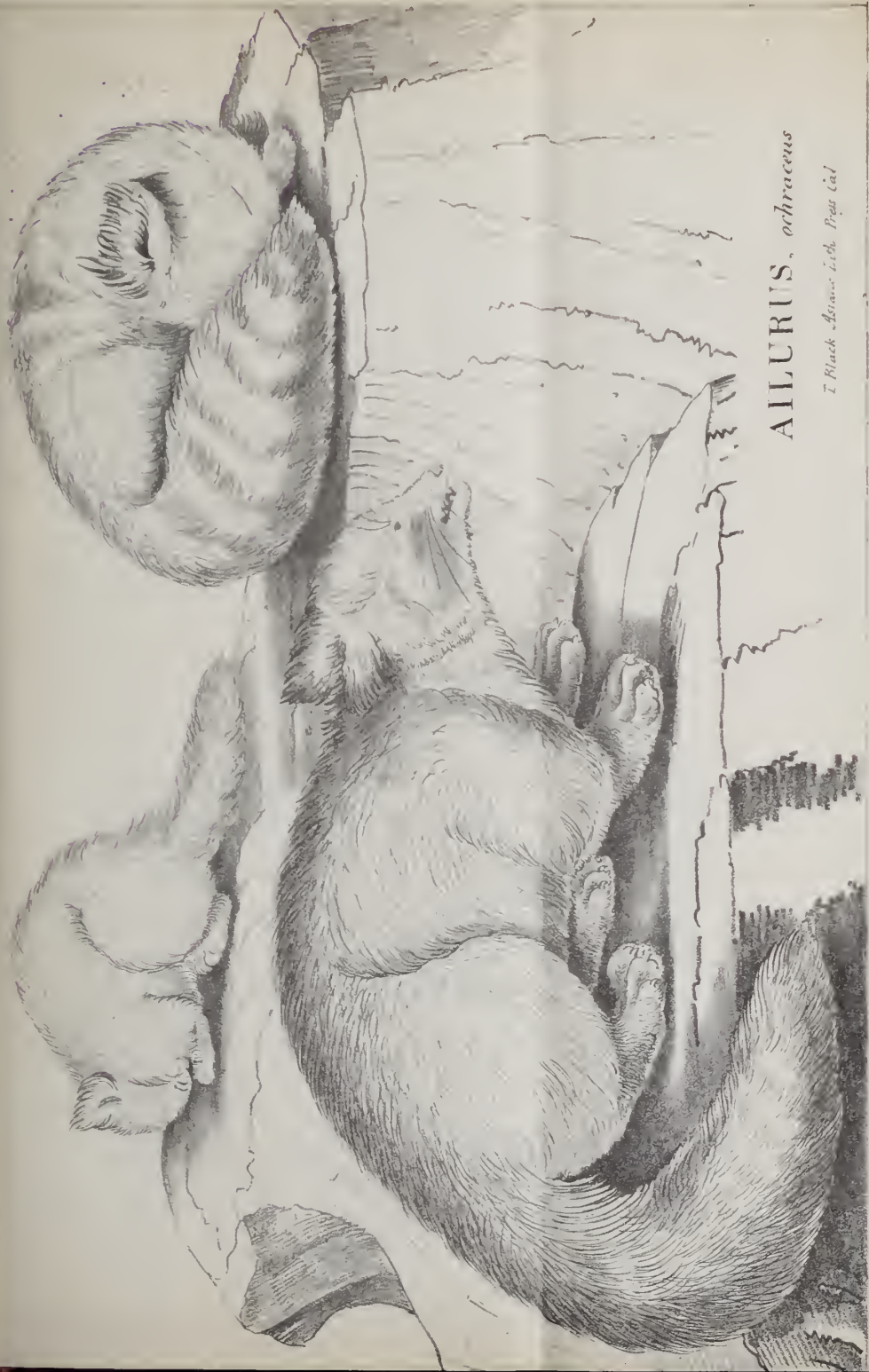
with alacrity. But at the same time I stated to the leaders of this science in England what a pity it was that want of ordinary measures on their part to secure the co-operation of their countrymen in the East should thus continue to prevent England's reaping the zoological harvest of her own domains; and I pointed to my own drawings, specimens and description of the structure and habits of *Ailurus* lying unused in their hands whilst their *Journal* was putting forth the mere crumbs gathered from Cuvier's\* table, and whilst his active son-in-law was then preparing under my very eye and with my own aid to complete the supercession of what ought to have been from the first, and might even yet be in part, English researches. How and why my appeal failed I know not. They order these things better in France: and but for the untimely death of Du Vaucel and Diard, not merely the group of the Cat-toed Plantigrades, but every other group of Indian zoology, would have carried the permanent traces of English want, and French possession, of fact! I know not whether this reversion to the past may help to lead to that future concert and co-operation on our own part between the closet and the field, the men of home resources and the men of local opportunities, from which English zoology might yet derive such enormous advantages. But at least it will be allowed that the subject of my present paper has almost irresistibly prompted this allusion to the past; for, on recurring to this group of animals after a lapse of 12 to 15 years, I find, not only the ample materials placed by me in 1833 within reach of my learned countrymen for the illustration of one genus (*Ailurus*) unused, (save for the completion of the dental formula,) at the sametime that the crudest statements relative to it continue to this hour to be put forth ex cathedra, but also the ample materials for the illustration of the other genus (*Paradoxurus*) which were not only collected but used and applied by Dr. Campbell and myself in 1835, as completely neglected, English writers on Indian zoology seeming to opine that it is a work of supererogation to consult the *Transactions* or *Journal* of the great *local* organ and channel of scientific research!† I do not now possess materials for the elucidation of these

\* *Zool. Journal*, Vol. II. 419. Vol. III. 275.

† *As. Trans.* Vol. XIX. pp. 72—86, where the structure and habits of 3 species are described very fully: And yet Mr. Gray in 1846 (*Catalogue*, pp. 9, 10) quotes these as undescribed. Nor is there any sign that Mr. Waterhouse or Col. Smith had ever

AILURUS, ochraceus

2 Black Bears with Piglet







genera so complete in some respects as I formerly had. On the other hand I have added some fresh items to my former knowledge of the animals, and I can still refer to much that is valuable relative to those pristine investigations; and as the Wáls or Pandas are animals as rare as they are understood whilst the Screwtails, if commoner and better known, are still an enigma in many essential respects, I purpose to put together such an account of the organization and habits of both genera as my present appliances and means will permit.

In 1833 I transmitted to the Zoological Society a full and careful description of the habits and of the hard and soft anatomy of *Ailurus*, in the composition of which I was assisted by Dr. Campbell, and which latter included a comparison with the anatomy of *Ursus* on the one hand and *Ursitaxus* on the other. What became of that paper I know not, and have now to regret that the original MS. was lost with many others of great value at the period of my hurried departure for Europe. But the memoranda I still possess contain many valuable particulars, which I now proceed to summarise.

Order CARNASSIERS.

Family CARNIVORA.

Tribe PLANTIGRADES.

Genus AILURUS, Cuvier.

*Range.* The Ailuri appear to be confined exclusively to the sub-Himalayas, no species having yet been discovered elsewhere. In these regions their habitat is limited to tracts between 7 or 8, and 12 or 13,000 feet of elevation, so that they tenant the Northern confines of the central region of the mountains and all the juxta nivean or Caehar region as far as the forests extend, far beyond the limits of arboreal vegetation; they do not dwell in the direction of the snows.

*Manners.* These quiet inoffensive animals in their manners and diet much resemble the Badgers of our land, the Lemurs of Madagascar, and the Racoons, Coatis and Potos of America, the last most nearly; but as few persons are familiar with these animals, I shall, to avoid the illustration of *ignotum per ignotius*, proceed to mark the differences from the first named animals, to wit, that the Badgers are sub-omnivo-

referred to the Transactions. Let me add that in these allusions to the past I utterly disclaim complaint on my own part, but think that for those whom it concerneth advertence to the past may help the future.

rous diggers, dwelling in cavities of their own formation, whereas the wáhs are vegetalivorous climbers, frequenting trees much, but breeding and feeding chiefly on the ground, and having their retreat in the natural resiliencies of rocks. They are monogamous, and live in pairs or small families, consisting of the parents and offspring, who all remain together till the next brood is about to appear, when the mother drives the grown young off. How long the female gestates I cannot learn, but she brings forth amid the recesses of the rocks in spring or early summer, almost always two at a birth, one of which is frequently much larger than the other, though the sexes at maturity hardly differ in size and not at all in aspect, nor the young from the parents in the latter respect. The Ailuri feed on fruits, tuberous roots, thick sprouts such as those of the Chinese bamboo,\* acorns, beech mast and eggs. The last they are very fond of, and eating them is the nearest approach they make to animal food, unless we must also add to the list of their eatables the young of birds and of small mammals—which I doubt, though I am assured of the fact. In general the wáhs eschew flesh, fish, insects, reptiles, absolutely. But they love milk and ghee, and constantly make their way furtively into remote dairies and cowherds' cottages to possess themselves of those luxuries. Their ordinary feeding times are early morn and eve. They sleep a deal in the day and dislike strong lights, though not nocturnal in their habits of seeking food. Their manners are staid and tranquil: their movements slow and deliberate: their tempers placid and docile, so that they are easily tamed and may be suffered to go abroad soon after they are taken, even though mature, and still more if young. They are delicate animals and cannot endure heat at all, nor cold well, amply and entirely as they are clad in fur. They are not pugnacious nor noisy, but remarkably the contrary of both. As climbers no quadrupeds can surpass, and very few equal them, but on the ground they move awkwardly as well as slowly, yet without any special embarrassment. Their slow action is a perfectly plantigrade walk; their quick, a series of bounds with the wrists touching the ground, but not the tarse, nor of course the heel, and the back always, though more especially in quick movements, much arched, but the tail little raised even under excitement. Saving the last particular, such in action is the Marten of these Hills (*Flavigula*) and the

\* Hence one of their names, viz. *Nigálya-pónya*.



Urva and Helictis, and, in a less degree the Badger, but not the Bear-Badger (*Ursitax*) nor the Bear, whose backs are uncurved, and their bounds more directly forward, and less digital quoad the hind feet, when in quick movement. In its power and mode of climbing the Wah most resembles the *Paradoxuri*, but also much the *Martens*, and far surpasses the Bears which can climb only in youth, and in descending are obliged to let themselves slip or slide down, tail foremost, whereas the Wahs, like the *Potos*, throughout their lives climb steadily and firmly, upwards and downwards, without any necessity for "turning their backs on themselves," or any dependance on slope or on spring, their high scansorial faculty being the joint result of their ursine powerful and highly articulated limbs and of their sharp feline talons, as in the case of the *Paradoxuri*, animals which the *Ailuri* intirely resemble in the substance, and I think\* also in the details, of these most singular structural combinations, combinations to which we must also refer the mode of fighting peculiar to both genera, viz. by grappling and scratching with all four extremities at once. Neither the *Paradoxures* nor the *Ailures* are wont to use the erect attitude of the Bears on these occasions. On the contrary, they roll on the ground, whilst hugging and tearing each other: nor did I ever observe either employ the hands as the *Racoons* and *Coatis* and Bears do to facilitate the process of eating. The Wahs, as I have observed above, sleep much by day, though not strictly noctivagrant, and they repose frequently in an upright attitude resting on the large broad palma and planta with the head tucked between the fore-legs and under the chest, like *Racoons*† and *Lemurs*,‡ but more generally, like *Dogs* or *Cats*, that is, laid on the side and rolled into a ball, the head being concealed by the bushy tail which is carefully drawn round so as to cover the eyes and exclude the light. The Wahs have little of that eminent development of the senses which distinguishes most animals as opposed to man: their touch, sight, and hearing are dull; their smell not very acute, though the quickest sense they have; and hence they are easily taken, having moreover little speed, cunning, or ferocity to protect them.

\* I speak doubtfully, because I have not the entire skeleton of *Ailurus* now to refer to, nor copy of the paper above alluded to as sent to the Zool. Society in 1833, in which the hard anatomy was throughout detailed from several perfect specimens.

† *Regne Animal*, II. p. 249.

‡ *Idem*. I. p. 325.

I have had many brought to me and have kept several for a year or two in Nepal, feeding them on rice and milk or milk only, or eggs, all of which they like, but wholly refuse rats, fish, insects, snakes, and rarely and reluctantly taking flesh of any kind. I have often put a small live fowl into their cage, but seldom knew them kill and never eat it, though if it approached them too nearly they would rush at it and give it a severe and possibly fatal blow with the fore paws. The amenity of their ordinary disposition is finely portrayed in their gentle countenances, and, as they are free from all offensive odour, they would make nice pets for ladies, particularly when young. They drink by lapping with the tongue and moderately. They hiss and spit like cats when angered, and, if extremely so, utter a short deep grunt like that of a young Bear; but ordinarily they are quite silent. The flesh is never eaten: but from the prepared pelage caps are made, and that is the limit of their œconomic value.

*Names and species.*—To the Tibetans, Nepaulese, and Sikimites the Ailuri are known by the names Wáh, Oá, Uktónka, Saknam, Thóng-wáh and Thó-kyé. Also, Yé and Nigálya pónya. I never heard the name “Panda,” nor did I ever see a specimen answering to the description, in point of colour, of the Panda.\* Wherefore I think it probable that the Nipaulse and Sikim species may be different from the Panda, and that the latter is a species peculiar to Bhútán. Under this impression and in order to complete my account of the former, I shall add the description of its colour and subjoin a fresh trivial name. Panda or Fulvens of Cuvier is as yet the only recorded species.

*General form and aspect.*—Ailurus Ochraceus, Nepalese Ailurus. Above deep Ochreous red; below and the ears, entire limbs, and tip of tail jet black † Head and tail paler than the body and fulvous: this paler hne displayed in frequent rings upon the tail, and in a vague diluting merely of the red tinge upon the head. Face, chin and lining

\* Nat. Library, XIII. 217, and Pl. 17: Zool. Journal, ut supra.

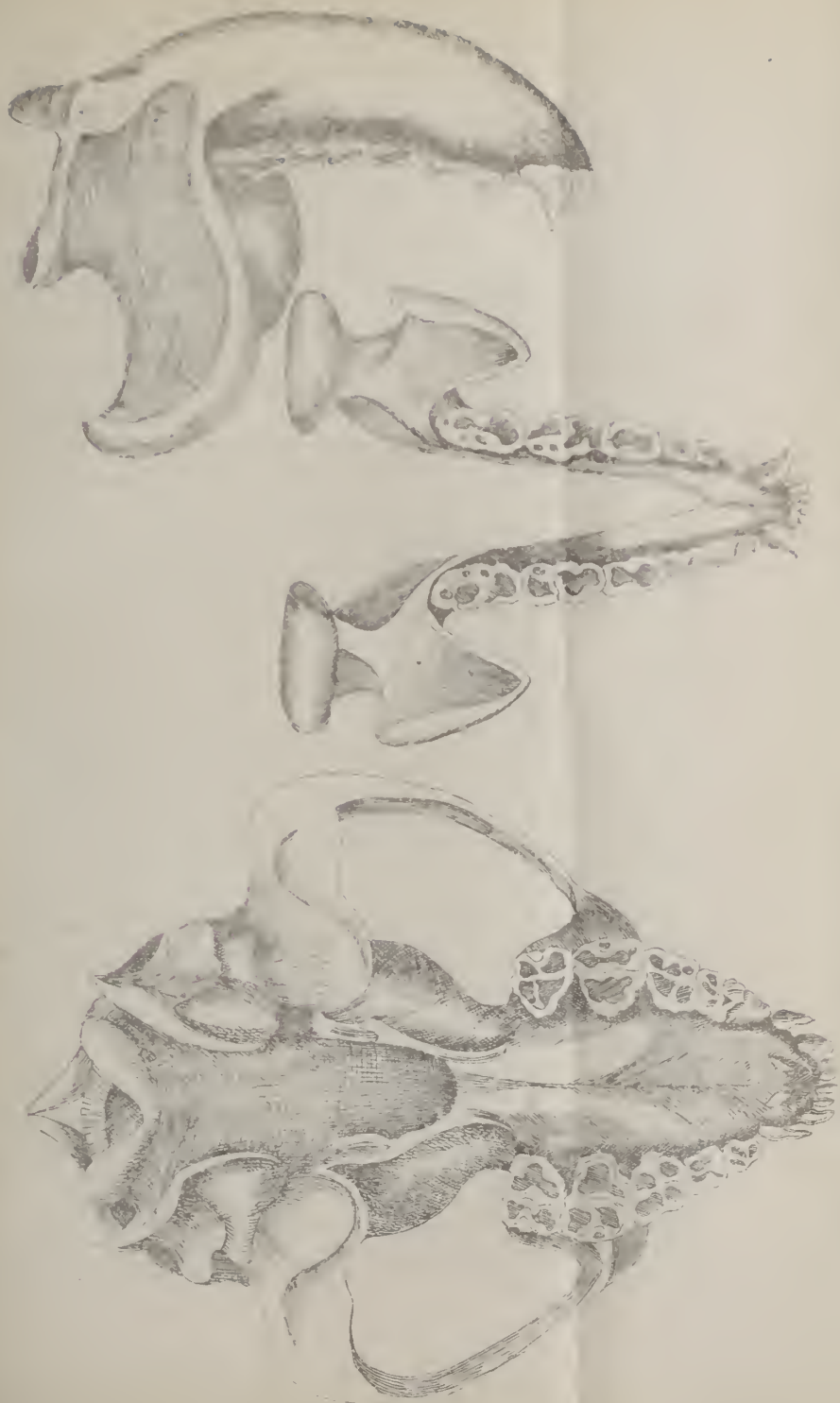
† Thus the Wáh is one of the infra nigrescent group, a group comprising Ursitax, Urva, Mellivora, Galictis (Bell), Meles, Taxidea, Eira, Arctonyx, Ailurus, and consequently this peculiarity would seem to be but a doubtful index of essential conformities, though perhaps we may thus be guided to the clue of that singular interlacing whereby the Ursine-taloned or digging, and the Feline-taloned or scratching Subplantigrades so remarkably cross and recross each other, as though it were possible to reconcile a Pangoline with a Tigrine nail !!

of ears, white. From eyes to gape a broad vertical line of ochreous red, blending with the dark inferior surface. Hairy pads albescent. Monstaches white. Eyes deep brown. Nude muzzle black. Snout to vent 22 inches. Head  $5\frac{1}{4}$ . Tail 16. Height 9 to  $9\frac{1}{2}$ . Weight 7 to 8 lbs. Pelage very thick, loosely applied to the skin, of two sorts; the outer hair, rather harsh than fine, straight, of moderate equal length ( $1\frac{1}{2}$  inch) and covering every part of the animal save the extremity of its nose; the inner vest, shorter, sparser and woolly. Internally the pelage is dusky; externally, deep ochreous; and on the back the hairs are more or less tipped with fulvous, especially in old age. In their general appearance the Wahs are quite unique. They might be described like the Racoons as small Bears with long tails, did not their short sharp visage and eminently bland expression of countenance sunder them intirely from Ursine semblances, and approximate them to the Lemurs, particularly those typed by *Galago Macaco*: but to be apprehended they must be seen.\* They have a short sharp conic face ending in a neat round muzzle in which the dog-like nostrils are pierced antero laterally; a small unprominent eye situated nearer to the nose than to the ear, and having a round nearly unchangeable pupil; rather small moustaches and minor tufts over the eyes, behind the gape, on the cheeks and on the chin; a broad rounded head; moderate sized, highly but remotely placed ears of a narrow conoid form tending to a point and almost hid by their ample confluent lining and tufts; helix void of fissure; simple conch; small basal tragus and antitragus; a longish yet thick neck and body; short strong plantigrade limbs ending in large very mobile pentadactylous feet, armed with feline talons and enveloped in woolly socks with Leporine completeness; and, lastly, a long thick cylindrico-tapering tail which is trailed like a fox's brush and neither convolved with the *Paradoxuri*, nor prehensile with the *Arctictes* and *Potos*, close as undoubtedly is the relationship of these genera, and especially the last named, to *Ailurus*.

*Osteology—Skull.*—The skull of *Ailurus* possesses characters quite unique; its extreme sphericity, its great height, the surprising curvature not only of the superior but of the inferior outline also, the ex-

\* See the accompanying admirable sketches showing the animal in all its ordinary attitudes, and done from life.

treme bend of the rami of the lower jaw, the enormous size of the postea and vertical portion of the lower jaw, the elevate position of its condyles, the small size and inward inclination of the occipital plane, the high position of the occiput with respect to the whole skull, lower jaw *included*, its low position with respect to the encephalon, or generally to the whole skull *without* the lower jaw, the great size of the alæ or crura of the occiput, the extreme smallness of the auricular tympana and generally of the organs of sense, the very deep cylindric hinging of the jaws, yet so as to admit much lateral motion, the breadth of the upper jaw and teeth, the narrowness of the lower jaw and teeth, and the consequent high lateral action whereby alone their crowns can grind on each other, the perfectly triturant character of the molars, consisting not only in their breadth and flatness of crown, but in the admission into their composition of the soft dark substance of ruminant teeth—all these are characters of the skull which in their combination it would be in vain to look for in any other genus of the Carnivora, and many of which seem to approximate the Ailuri rather to the Ruminant than Ferine model. To the cat's skull there is not more resemblance than to the Bear's, for in Ailurus as compared with Felis the culmenal line is as much more bent down a parte post, as it is less so a parte ante; and short and inclined as is the face in Ailurus, it is as much longer and straighter than that of Felis as it is shorter and less straight than that of Ursus. The general style and proportion of the nasals, frontals and parietals of Ailurus are much nearer to those of the same bones in the Screwtails, the Martens, the Badgers, the Bear-Badgers, the Helictes and the Urvæ, than in the Cats or Bears; and in the form and size of the orbits and of the frontals there is an extreme similitude amounting almost to identity with the former—an utter contrast with the cats, with Ursus less contrariety. In Ailurus the nasals are short and a little retroussé; the frontals moderately broad and arched lengthwise and across; the temporal depressions moderate but distinct; the orbits small and very incomplete; the zygomæ very ample and terminating posteally and inferiorly in large semi-cylindric processes that serve to hinge the jaws so completely as to render separation of them even more difficult than in Meles or Taxidea; the parietes ample in length, breadth and swell, though the cristæ, as well as the temporal fosses, be decided—as much so as in the Badgers and Screwtails, more so than







in the Martens or Cats, in which the fosses are evanescent ;\* the auditory cavities very small ; the olfactory cavities moderate ; the frontal sinuses large ; the palatal bones curved convexly, and the rami of the lower jaw as much concavely ; the coronoid processes of the latter enormous and inclined forwards ; the bones of the skull in general thick and massive ; proportion of the face to the rest of the skull, as one-third.

*Teeth.*—The dental formula is  $\frac{6}{6} \cdot \frac{1}{1} \cdot \frac{1}{1} \cdot \frac{5}{5} : \frac{5}{5}$  ; but the first pair of the lower jaw are deciduous, and, in old animals especially, the molars are (I write with fine samples before me) more frequently  $\frac{1}{2} : \frac{5}{5}$ . The incisors are close together and ranged nearly in a straight line to the front, those of the lower jaw touching the canines, whilst those of the upper jaw are separated therefrom by the usual interval for the passage of the lower canines. The exterior incisors of the upper jaw are larger than the rest, and are as much scarped externally as are the lower canines internally, by reason of that friction of the one against the other which is caused by the high lateral action of the jaws. Canines small, conic, little curved, faintly grooved lengthwise, the upper insulated, the lower in contact with the incisors and molars. Molars divided by their characters into false and true, without any possible distinction of carnassial and tubercular teeth. Premolars  $\frac{2}{3} : \frac{2}{3}$ , including the deciduous ones : last pair rather trituran than trenchant. True molars  $\frac{3}{3} : \frac{3}{3}$ . Upper true molars disposed transversely, squarish in form, nearly equal in size and exhibiting on their, in general, flat crowns, 3 or 4 sunken central spaces filled with the dark soft substance above alluded to, and which is bounded serpentinely by rounded rather than dentated margins of enamel and a central transverse sinuous ridge of the same. True molars of the lower jaw disposed lengthwise, narrow, parallelogramic or elliptic ; the first pair smaller than the two others, which are equal ; and all exhibiting central masses of crista petrosa enveloped by a serpentine sinuous margin of enamel, as in the upper jaw nearly. In the composition, forms and action of these teeth taken together, there is little or no real resemblance to be found with the teeth of even the least carnivorous of the ordinary carnivora, such as the Bears, Badgers, and Screwtails, though it is among them that one

\* In the Viverrines, the fosses and the crests are both of extreme size, and the brainpan consequently much reduced. In these respects there is no resemblance with the Ailures ; nor in other respects.

naturally looks for the dental prototype of *Ailurus*. But I apprehend that several of the genera to be presently enumerated as the probable components of the group of Cat-toed Plantigrades, will be hereafter found to exhibit a closer resemblance and more harmonious blending with the *Ailurine* type of dentition as of general structure.

*Bony carcass*.—I have not now a perfect skeleton of *Ailurus* to refer to ; so far as I can trust my notes, the bones are as follows :—Cervical 7. Dorsal 13. Lumbar 5. Sacral 3. Caudal 22. Carpal 8. Metacarpal 5. Digital 3, for each toe fore and aft. Tarsal 9. Metatarsal 5. Ribs 13 pairs, whereof 5 pairs are false, and 11 true. The short strong and highly articulated limbs, together with the finely harmonising flexile wrists and ankles, bear an extreme resemblance to the extremities of the *Martens* (*Flavigula*\*) and *Screw-tails*, and have much similitude with those of the *Bears* (*Helarctos*) but form a complete contrast with the extremities of the *Cats* and of the *Civets*. On the other hand, the highly mobile digits, disencumbered of the palmary and plantary mass, are much more similar to those of the *Cats* than to those of the *Bears*, and bear a resemblance amounting almost to identity to the digits of the *Screw-tails* and *Martens*. The 5th or internal digit is very little withdrawn from the front, and is forthcoming alike in the anteal and postal extremities. Of the other 4 digits the 2 central are nearly equal and the 2 lateral also, but with an andromorphous bias, and the whole are united as far forward as the terminodigital pads by a highly elastic membrane, which allows the freest play to the digits.† The thick socks however in which the feet of the *Ailuri* are completely enveloped, must impede their power of feeling and even of raptorial grasping, as compared with the paws of the *Martens* and *Paradoxures*, though the extreme mobility of the ungual phalanges still leaves the sharp and compressed talons almost as serviceable as in either of those genera. The talons of the *Wahls* are as highly curved, as much compressed, and as sharp, as in the *Screw-tails* or in the *Martens*, and I might add, in the *Cats*, for there is hardly any appreciable difference between the four genera in those respects, and

\* In this animal the dorsal vertebræ (and ribs) are 14 : the lumbar 7 : the sacral 4 : the caudal 26 : the rest as in *Ailurus* ut supra. The teeth of *Flavigula* (molars) are  $\frac{3}{2}$ . It is therefore a *Martes*, not a *Mustela*.

† See accompanying sketches.



the talons of all are equally reversile over the penultimate phalanges, and equally retained there, except when required, by the strong tensor tendons, the difference of the digits consisting in this only, that those of the Martens are not at all sheathed, those of the Paradoxures and Wáhs are but half sheathed, or little more than half, and those of the Cats, completely so. This is a difference which but for the terrific energy of the Feline paw one should be disposed to underrate, and I confess that after the most careful examination of the organs I am inclined to attribute the superior force of the Feline arm's stroke to the momentum and velocity inseparable from the digitigrade structure rather than to any difference in the organization of the digits and talons, points in which it appears to me that the Ailuri, Paradoxuri and Martens\* are all upon a par with the Cats, or nearly so. I am aware that this is a statement at variance with the law of correlation and dependance of parts in structure. 'Show me,' exclaims our great master Cuvier, with the noble confidence of genius, 'show me a nail and I will show you the whole structure of the animal which bore it.' And I shall be probably told with a sneer that the Cats and Weasels are the most exclusive of blood spillers, whilst the Paradoxures are mainly, and the Ailures (according to my own account) exclusively, vegetativorous. I can only say in reply that I endeavour faithfully to report what I have carefully examined; that he who affixed the Feline paw to the Ursine arm of Ailurus apparently delights to accomplish the same ends by very varied means; that there are many things in his *systema naturæ* which our's yet halts behind the comprehension of;† and that, for example, in our systems the contrast is much greater between the structures, than it is between the habits, of *Ursus ferox* and of *Felis tigris*, or of the Racoons and Coatis on one hand, and the

\* I mention the Martens more frequently than the Weasels proper, because I have before me fine fresh specimens of the former; but in fact the latter agree with the former in regard to the feet.

† The systems which associate Ailurus and Arctictis with the Bears, and dissociate *Ursitaxus* and *Mellivora* from the Bears, and range *Lutra* with the Seals, and *Paradoxurus* with the dog-like *Viverræ*, are surely not quite in harmony with the method of the divine designer. The Palmate foot of *Lutra* may be seen in *Martes*, *Paradoxurus*, &c. and the free lateral and postæal action of the hind legs of *Lutra*, in those genera, as well as in the Coatis, the Potos, the Wáhs, &c. So that there is no need on *these* accounts to sever *Lutra* from his old allies.

Wáhs and Benturongs on the other. I pretend not to account for, I only report, the frugivorous habits, gentle disposition, ursine arm, feline paw, profoundly cross-hinged yet grinding jaws, and purely trituran and almost ruminant molars, of *Ailurus*; and to these I now proceed to add, however they may square or not with systems which Cuvier himself was forward to deprecate the premature march of, the details of the soft anatomy of *Ailurus*, merely adding in this place with reference to the socks of *Ailurus*, that we have examples of this peculiarity not only among the plantigrade Bears (*Ursus Maritimus*) but also among the digitigrade and purely carnivorous Weasels (*Lutra latrix*.)

*Soft anatomy.*—The anus, peroneum, and prepuce, are entirely free from glands and pores. There is no trace of the Cæcodean anal glands and pores of the Mustelidæ, or of the Euodean preputial ones of the Viverridæ, so that in this remarkable respect *Ailurus* is affined to the Feline or Ursine, and sundered alike from the Musteline and from the Viverrine groups. Anus large, nude, void of all trace of gland or pore. All the proximate parts covered with hair. Perineum simple. Scrotum wanting. Testes long, narrow, concealed in the groin. Penis directed forwards, dog-like, and furnished with a small simple bone. Vulva simple. Uterus bicornute with large horns. Teats eight, and ventral, or rather disposed in fours, whereof the upper 4 are sub-pectoral, and the lower 4, sub-inguinal. Intestinal canal five lengths of the animal, nine feet long, of great equal diameter, void of cæcum and about one inch in width. Stomach large, simple, membranous, thick coated and glandular towards the lower orifice, hemispheroidal, with terminal orifices, of which the lower one for about 3 inches presents the character of a subsidiary stomach or glandulous neck to the ordinary stomach. Great diameter of the stomach 11 to 12 inches. Small,  $4\frac{1}{2}$  to  $5\frac{1}{4}$  inches, exclusive of the glandulous neck. Spleen tongue-shaped, purple red,  $5\frac{1}{4}$  inches by  $1\frac{1}{4}$ . Lungs 6 lobed. Liver 6 lobed and a lobulus. Gall bladder very large, ovoid, occupying the whole centre of the largest lobe of the liver and passing through from side to side of it. Tongue smooth, simple, not unusually extensile. Pupil of the eye round ordinarily, and but slightly. Third eyelid capable of being brought over the whole organ nearly.

The above details of the soft anatomy, like those of the hard, offer

nothing very decisive as to the affinities of *Ailurus* with reference to the grand divisional types. Looking to the chylipoetic viscera, for example, the proportionate length of the intestinal canal is much nearer to that of the Cats than to that of the Bears, whilst the absence of cæcum is more Ursine than Feline. In the Bears (*Helarcetos*) the intestines are 12 or 13 lengths of the animal; in the Cats but 3 to 4; in the Weasels, *Viverrines* and *Paradoxures*, 4 to 6; the greater lengths belonging to the latter two, which nearly agree in this respect with the *Walis*, but differ from them by the presence of the cæcum, which again the Weasels with but 4 lengths of intestine want, like the *Ailuri* with 5 lengths. Upon the whole, though the foregone details of the structure and of the habits of *Ailurus* cannot fail to be highly interesting to all real students of Zoology, yet the structural particulars want completeness fully to meet a case of so much difficulty, although if a similar amount of information were forthcoming relative to all the several animals composing that group, with which I suppose *Ailurus* to be more immediately connected, the question of proximate affinities at least would be placed in a tolerably clear light. The genera to which I allude are *Hemigalea*, *Nandinia*, *Amblidon* vel *Paguma*, *Cynogale*, *Cryptoprocta*, with a *Viverrine* dental formula—and *Galidia*, *Galidictis*, (*Galictis* of Geoff), *Bassaris*, *Arctictis*\* and *Cercoleptes*, whose dental formula appears to be, at least as to number and general character of teeth, identical with that of *Ailurus*, due allowance being made for the disturbing influence of deciduousness in the pre-molars.

The fortunate circumstance of our being enabled in regard to the last named genus, or *Cercoleptes*, to refer to the investigations of a Cuvier,† an Owen,‡ and a Humboldt,§ exercised upon living and perfect samples (not mere skins or bones) corroborates as far as it goes, the correctness of the above conjectures, which are further confirmed by Mr. Cantor's scantier but valuable notices|| of *Arctictis*.

\* There are some valuable particulars relative to *Arctictis* by Mr. Cantor in No. 171 of the Journal. The preputial gland and linear vertical pupil of the eye, and presence of a cæcum are notable coincidences with *Paradoxurus* and deviations from *Ailurus*.

† F. Cuvier apud Menagerie Royale, quoted by Griffith, *Regne* II. 266—9.

‡ Zool. Jourl. Aug. 25, 1835.

§ Travels as quoted by Griffith. loc. cit.

|| Asiatic Journal, Bengal, No. 171, pp. 192—4.

It is thus demonstrated that the Potos of the new world represent with considerable accuracy the Pandas or Wáhs of the old world ; that the two have much conformity of structure and of habits ; and that both exhibit that leaning towards the Lemurs whereby the perfectly vegetalivorous diet, quasi ruminant teeth and scull, extreme gentleness of aspect and of nature, slow movements, and somnolent propensities of the Wáhs are perhaps best explained. Those who would trace to full advantage the identities of organization and of economy that exist between the Potos and Wáhs, must compare at first hand the statements of Messrs. Owen and Cuvier as referred to below, with the details of this paper.

The differences are as follows. *Cercoleptes* differs from *Ailurus* by the more confined palmation of the digits (to 2nd phalanx only) by the nakedness of the soles, by the large eye, with higher contractility of pupil, by the lesser development of the external ear, by the prehensile tail, suctorial tongue, limited number of teats (two), absence of moustaches, and possibly by some diversities of dentition, though so far as may be judged by description (*Regne* II. 267) the discrepancies must be inconsiderable ; and lastly, by the non-terminal position of the upper orifice of the stomach. The identities consisting in the proportion and form of the chylopoietic viscera, in the long horned uterus, in the large bony tentorium, in the wanting clavicle, the simple anus and prepuce, and in the smoothness of the tongue, are among those best worthy of note in regard to structure, whilst in reference to manners and habits, so far as these are reported, the only differences would seem to consist in the nocturnal, not crepuscular activity of the Potos, in their honey-sucking or suctorial propensities, like to those of the Ratel and Labiate Bear, and lastly, in the greater addiction to tree haunting and to clambering there by the help of the prehensile tail. Again, the suggested Lemurine resemblances of *Cercoleptes* hold wonderfully true of *Ailurus*, and hardly less so (though this makes against the Cat-toed grouping) the *Procyonine* and *Nasuan* resemblances, as any one may satisfy himself who will compare the foregoing account of *Ailurus* with what he will find in the *Regne* relative to the Lemurs\* and to the Racoons and Coatis.† With respect to these Lemurine affinities, now demonstrated by science, but first suggested by unlettered

\* *Regne* I. 322—332.† *And* II. 248—262.

experience, we have in the story of Bosman's Negroes as in that of Mr. Gardner's Máli, a strong proof how "practice will creep where theory can hardly soar;" for the Negroes decided before Cuvier or Geoffroy that the Potos were Lemur allies, just as the Máli multiplied his tea plants by grafting on the Camelia (Kisi) at a time when eminent Botanists held the notion to be absurd!\*

That the second series of animals I have grouped together above are more nearly related among themselves than to the first series seems probable; but that the first series also blend with them in some remarkable points any one may satisfy himself by comparing Dr. Cantor's details of *Aretietis* (Journal, No. 171) and mine of *Paradoxurus* (Trans. Vol. 19), with those above given and referred to, when he will perceive that the Bentrong, notwithstanding its Ailurine affinities, is linked to the Screwtails and *not* to the Wáhs, by its large linear-pupiled eyes, nocturnal habits, sub-carnivorous regimen, œœnum and euodean preputial apparatus, and to the Potos by the two first marks; whilst the peculiarities of the tails of the three animals, though not quite identical, yet constitute a common and antiailurine feature. I must not enlarge further however at present on the subject of these real and supposed affinities.

Ere long I trust to be able to complete my report of the Ailurine osteology, and in the meanwhile I shall terminate this account of the Wáh with a full statement of the dimensions of a mature male and female.

|                            | Male. |    |               | Female. |    |               |
|----------------------------|-------|----|---------------|---------|----|---------------|
| Snout to vent,.....        | 1     | 10 | 0             | 1       | 10 | 0             |
| Head to the occiput, ..... | 0     | 5  | $\frac{1}{4}$ | 0       | 5  | $\frac{1}{4}$ |
| Tail only, .....           | 1     | 4  | 0             | 1       | 4  | 0             |
| Tail and hair, .....       | 1     | 6  | 0             | 1       | 5  | $\frac{1}{2}$ |

\* A fact which occurred in 1823—4, at Cathmandu, where fine Chinese tea plants have long existed, brought from China in 1790, by Cashmiris, from which Dr. Abel was abundantly and speedily supplied to his surprise, by the Máli's practical science, who when questioned by Dr. A.'s desire, *why* he had thought of grafting a *Thea* on a *Camelia*, replied with greater surprise, because the two were evidently of the same genus (*Ját*)! The Kisi is indigenous and abundant in Nepál. The teas flower and fruit abundantly, almost perpetually, but the seeds seldom vegetate. The Kisi is as abundant at Dorjiling as at Cathmandu, and the Chinese tea plant flourishes as well here as there, so that if more plantations are needed, here is a fine site for some.



|                                                     | Male.  |   |                 | Female.              |   |                |
|-----------------------------------------------------|--------|---|-----------------|----------------------|---|----------------|
| Snout to fore angle of eye, . . . . .               | 0      | 1 | $\frac{1}{2}$   | 0                    | 1 | $\frac{5}{8}$  |
| Thence to base of ear, . . . . .                    | 0      | 3 | $\frac{1}{4}$   | 0                    | 3 | $\frac{3}{8}$  |
| Ear only, . . . . .                                 | 0      | 2 | $\frac{3}{4}$   | 0                    | 0 | 0              |
| Ear and tuft, . . . . .                             | 0      | 3 | $\frac{1}{4}$   | 0                    | 3 | $\frac{1}{4}$  |
| Width of ear, . . . . .                             | 0      | 0 | 0               | 0                    | 1 | $\frac{7}{8}$  |
| Girth behind shoulder, . . . . .                    | 1      | 1 | 0               | 1                    | 0 | 0              |
| Mean height, . . . . .                              | 1      | 9 | $\frac{1}{2}$   | 1                    | 9 | $\frac{1}{4}$  |
| Length of arm, . . . . .                            | 0      | 5 | 0               | 0                    | 5 | 0              |
| Length of fore arm, . . . . .                       | 0      | 4 | $\frac{1}{2}$   | 0                    | 4 | $\frac{1}{4}$  |
| Palma and nails, . . . . .                          | 0      | 4 | $\frac{3}{8}$   | 0                    | 4 | $\frac{1}{4}$  |
| Length of thigh, . . . . .                          | 0      | 4 | $\frac{11}{16}$ | 0                    | 4 | $\frac{1}{2}$  |
| Length of leg (tibia,) . . . . .                    | 0      | 5 | $\frac{1}{2}$   | 0                    | 5 | $\frac{3}{16}$ |
| Planta and nails, . . . . .                         | 0      | 4 | $\frac{3}{8}$   | 0                    | 4 | $\frac{1}{4}$  |
| Weight, . . . . .                                   | 8 lbs. |   |                 | 7 $\frac{1}{2}$ lbs. |   |                |
|                                                     | Skull. |   |                 |                      |   |                |
| Length, . . . . .                                   | 0      | 4 | $\frac{1}{2}$   |                      |   |                |
| Height, . . . . .                                   | 0      | 3 | $\frac{1}{8}$   |                      |   |                |
| Width between Zygomæ, . . . . .                     | 0      | 3 | $\frac{1}{4}$   |                      |   |                |
| Width inter parietes, . . . . .                     | 0      | 2 | 0               |                      |   |                |
| Base of incisors to fore angle of orbits, . . . . . | 0      | 1 | $\frac{3}{8}$   |                      |   |                |
| Thence to jut of occiput, . . . . .                 | 0      | 3 | $\frac{7}{16}$  |                      |   |                |

And now, the extent to which the above paper has insensibly run, warns me to postpone my proposed remarks on the Paradoxures to a future occasion, merely referring the reader who may desire in the meanwhile to compare the organization and habits of those animals and of the Wáhs as above given, to the 19th Vol. Asiatic Society's Transactions, where he will find ample details relative to the hard and soft anatomy, and to the manners of the sub-Himalayan Serewtails, of which there are four species; one, *Nepalensis*, which is the *Grayii* of Bennett, but priorly named by me; two, *Hirsutus*, the *Bondar* of Gray, of which *Pennantii* is not a Synonyme; three, *Laniger*, an entirely new and nivicolan species clad in wool, of an uniform isabelline brown colour, and four, *quadriscipitus noster* (new?) which is probably the *Penantii* of Gray, *Bondar* verus being unstriped, and this striped.



P. S. The following list of the species of *Paradoxurus* cum *Paguma*, according to various authorities, may be useful.

| Gray.            | Name secundum Cantor. | Hodgson.         | Habitat.                                        |
|------------------|-----------------------|------------------|-------------------------------------------------|
| 1. Typus,        | Hermaphrodita,        | "                | Deccan and Carnatic, Malay penins. and islands? |
| 2. Bondar,       | "                     | Hirsutus,        | Gangetic provinces, passim.                     |
| 3. Prehensilis,  | Hermaphrodita,        | "                | Malay Penins. and islands?                      |
| 4. Musanga,      | Hermaphrodita,        | "                | Malay Penins. and islands.                      |
| 5. Dubius,       | Hermaphrodita,        | "                | Idem.                                           |
| 6. Crossii,      | Hermaphrodita,        | "                | Idem.                                           |
| 7. Pallasii,     | Hermaphrodita,        | "                | Idem.                                           |
| 8. Leucopus,     | "                     | "                | ?                                               |
| 9. Larvatus,     | "                     | "                | China.                                          |
| 10. Trivirgatus, | Trivirgatus,          | "                | Malay Penins. and islands.                      |
| 11. Zeylanicus,  | Aureus,               | "                | Islands of Indian Ocean.                        |
| 12. Leucomystax, | Leucomystax,          | "                | Idem.                                           |
| 13. Nigrifrons,  | "                     | "                | India: part unknown.                            |
| 14. Penantii?    | "                     | *Quadriscipitus, | Sub-Himálayas: central region.                  |
| 15. Grayii,      | "                     | Nepalehsis,      | Idem, Central region.                           |
| 16. Laniger,     | "                     | Laniger,         | Idem: the Cachár.                               |

*Description and Analysis of the new Mineral NEWBOLDITE, sent from Southern India by Captain NEWBOLD, Madras N. I., Assistant to the Resident of Kurnool.—By H. PIDDINGTON, Curator Museum Economic Geology.*

I had mislaid (that is, too carefully laid by) this specimen, and feared for a long time that I had lost it, but fortunately finding it, I have not again delayed to place it in our collection, and to give to our valued correspondent Captain Newbold the credit which he deserves for his discovery; which is that of adding not only a new mineral, but, as will be subsequently shown, establishing a new *family* of minerals, of which we may hope for more genera as our acquaintance with Indian mineralogy (perhaps we might say with mineralogy in general?) augments.

\* General aspect of Bondar, but with four continuous dorsal lines and face marks as in Nipalensis. Habitat exclusively monticolous.

Our entire specimens are unfortunately very small, and thus I have been excessively cramped in my researches, for as will be seen, it is scarcely possible to obtain pure fragments even of a very small size.

I should describe it, as to external appearance and physical properties, as follows:—It is, where purest, and not weathered, of a clear apple-green, with considerable lustre on some of the facets of the numerous imperfect crystals of which it is formed, giving it the pearly glimmer of a green mica or of some of the green carbonates of Iron in a good light. Where weathered it is of a bluish grey-green, and the glance is more minutely silvery or micaceous, or at times steel-like.

Minute fragments of the pure mineral are semi-translucent at the edges, like those of fine apple-green serpentine.

When *powdered* its colour is of a very light greenish buff or fawn colour, becoming a little darker, or greenish, when exposed to a very gentle heat to drive off the little water it contains. When pulverising, if smartly rubbed or struck it emits a very perceptible odour of sulphuretted hydrogen.

Its hardness is 3-4 scratching Calc-spar, but not Fluor.

The streak is of a dirty fawn coloured white, but always with a minute silvery line at the centre where the knife has cut.

It has a slight earthy smell when breathed upon. It is brittle and easily pulverised.

The fracture is hackly, and highly glistening; the fragments are at times laminar and angular, but in truth they are so small and the nests and veins of the mineral so diminutive that it is not fair to judge of these characters. It seems to cleave readily in certain directions, but what these are cannot be judged of yet; the larger fragments incline to cubical or rhomboidal prismatic forms.

It does not soil, or mark, or adhere to the tongue on the fresh fracture.

The crystals are too small, confused and imperfect to judge well of their form, which however appears to approach to that of rhomboidal prisms.

The mineral seems much subject to decay by the oxidation of the iron, which is distinctly seen in some parts, leaving in the quartz what are called in Cornwall *ruggy* cavities (i. e. rough, jagged, and full of irregular ridges) coated with the peroxide of iron.

It occurs in very small nests and veins in masses of milk quartz. With one of the specimens of milk quartz there occurs a mass of bluish sulphate of Baryta, and another specimen is in a bluish very fine granular mass of sulphate of lime.

Its specific gravity I should estimate at about 4.25, to 4.50, calculated from a piece which was about half matrix, but this is a mere approximation.

In the tube and bulb tube it decrepitates and flies to pieces with a complete explosion, sending the fragments sharply into the face and eyes when tried on platina foil, as soon as heated; these fragments are mostly imperfectly cubical or rhomboidal.

It was found to contain about 1 per cent. of water when reduced to powder.

Nothing sublimes from it at the red heat of glass; but when driving off the water a slight odour of sulphur seems apparent from the crucible.

**BLOWPIPE.**—*Alone.*—A small fragment is infusible, but becomes of a dirty yellowish white, and is not magnetic. This, apart from its sulphur (subsequently shown) at once distinguishes it from Spathose Iron, for some of the green semi-transparent varieties of which, from its colour and decrepitation, it might be mistaken on mere inspection.

*With Borax* it is not very fusible; the bead transparent, yellowish, and slightly tinged with green.

*With Soda* fuses to a dirty brownish opaque bead; nothing is reduced from it; when moistened and a little fresh Soda added, the bead gives out the smell of sulphuretted hydrogen common to all the sulphates and sulphurets when heated with Soda, and it discolours silver foil.

*With phosphate of Soda.*—On charcoal, and the cake transferred to platina wire, a dull milk-white semi-transparent bead.

*The powder saturated with Nitrate of Cobalt*, and heated on platina foil, is of a dull brown.

*Via Humida.*—It dissolves readily in the mineral acids. Acetic acid does not appear to affect it. With concentrated hydrochloric and sulphuric acids much sulphuretted hydrogen is evolved. Boiled in nitro-hydrochloric acid it dissolves rapidly without evolution of sulphuretted hydrogen in any considerable quantity, if at all, and leaves

a flaky white residuum which coagulates into a soft globule floating on the solution, which is pure sulphur.

If the boiling is gentle the sulphur is obtained in a light flake.

The solution of the pure mineral in nitro-hydrochloric acid when filtered from the sulphur is of a pale gold colour. When evaporated it crystallised largely in minute silky needles, which appear in mamillated or concretionary heaps if the evaporation is slow. They are apparently insoluble in water, and in the mouth, with a slight astringency, (probably from the muriate of iron) they are tasteless and *lumpy* like argillaceous earth, though without any decided taste except an earthy one. The muriate of iron gelatinises amongst them. The concretions are soluble in nitric acid. At a red heat on platina they become dull but do not otherwise alter.

To re-agents the solution gives as follows:—To Sulphide Ammonium a dirty greenish-brown precipitate with black grains, which becomes of a sooty black, soluble in muriatic acid.

*Yellow Prussiate* of Potass very pale bluish white.

*Caustic Potass* very pale amber-white precipitate, plentiful.

*Carbonate Potass*, as Potass, but partly soluble in Ammonia.

*Ammonia*.—Sparingly, the reddish precipitate of iron; and a white precipitate with excess.

*Tinct : galls*.—Brown colour, but no precipitate.

*Oxalic Acid*.—A precipitate, soluble when ammonia is added.

*Phosphate Soda*.—White precipitate soluble in ammonia and in acids. Re-appears with Potass.

*Cyanide of Potassium*.—A dirty amber-coloured precipitate.

*By Wollaston's process (Carbonate of Ammonia and phosphate of Soda)*.—A plentiful precipitate, like that of the Phosphate of Magnesia is obtained.

#### ANALYSIS.

I have already adverted to the extreme difficulty of obtaining any portion of the mineral pure enough for an analysis. The process adopted was to pulverise the mineral and,

1. Dissolve it in nitro-hydrochloric acid, at a boiling heat.
2. Filter to separate the sulphur and silex.
3. Burn off the sulphur from the silex.
4. Precipitate the sulphuric acid formed in the solution by nitrate

of Barium, and add the equivalent weight of sulphur to that obtained in the solid state.

5. Precipitate by carbonate of potass in excess.

6. Digest again in nitric acid and precepitate the iron from the solution by Ferro-Prussiate of Potass, allowance being made for the Iron it contains. The solution evaporated is gelatinous, and this when calcined is the earth.

The results of the best of three analysis in which the assay was obtained by picking minute fragments with the forceps and examining them by the magnifier, but of which I could only collect 7.33 grains, gave—

|                                           | Per Cent. |        |
|-------------------------------------------|-----------|--------|
| Sulphur, .....                            | 3.77      | 51.43  |
| Silex, .....                              | 0.25      | 3.40   |
| Perox, Iron, 2.41. Iron, .....            | 1.68      | 22.92  |
| Earth (perhaps new,) .....                | 1.31      | 17.86  |
|                                           | <hr/>     | <hr/>  |
|                                           | 7.01      | 95.61  |
| Water by an independent experiment, ..... | 0.08      |        |
| Loss, .....                               | 0.24      | 3.39   |
|                                           | <hr/>     | <hr/>  |
|                                           | 7.33      | 100.00 |

As the proportion of sulphur is so large, we may at once assume that the iron is a bi-sulphuret, in which case the 22.92 per cent. of iron would require 28.84 of sulphur ; leaving thus 22.59 per cent. of sulphur to combine with the 17.86 per cent. of the earth.

The earth is obtained in so very small a quantity that it is impossible to do more than describe it and its peculiar properties, so far as they can be ascertained with any degree of certainty, and wait till a better supply\* of the mineral enables us to determine it.

This earth is of a pure white ; of a granular appearance under the magnifier, light and powdery in the crucible, and not *lumpy* like Alumina.

**BLOWPIPE.**—*When heated to a white heat on Platina*, no change : moistened and placed on Turmeric and litmus papers no effect, nor does it give any remarkable light.

\* I have received an additional supply of the mineral, but unfortunately it is only very minute veins or nests, and this time in the red carbonate of Cerium, described in the *Journal, Proceedings, July, 1846.*



*Nitrate of Cobalt on Platina.*—A very pale and somewhat dirty lilac colour, not approaching to the blue of alumina at all.

*With Borax*, in considerable proportion of assay to the flux, and at both flames a perfectly colourless and transparent glass.

*With Soda.*—A dead white enamel: clear red glass in the flame.

*Phosphate of Soda.*—Opaque pearly bead, which when very small is a semi-transparent crackly one.

*Via Humida.*—It is insoluble or nearly so in sulphuric and in nitric acids, which last sometimes gelatinises it.

It is insoluble in the fixed alkalies and ammonia, but seems partly so when newly precipitated, in carbonate of ammonia.

Its proper solvent is boiling nitro-hydrochloric acid, with which it crystallises when a nearly saturated solution, in fine brilliant silky or pearly points and needles, which have a sweetish astringent taste like the salts of Glucina and Yttria.

The ferro-cyanate of Potassium does not precipitate it.

When tried by zinc the blue precipitate of Titanium is not produced.

No precipitate was obtained in boiling it with sulphate of potass.

It is in all states when freed from Iron perfectly colourless.

From the minute quantities in which I have been able to obtain the pure earth, and the almost microscopic nature of the assays and testings, and the different characters it presents from all the known earths, I cannot venture at present to pronounce what it may be; and indeed would not even now publish my analysis did I not conceive it just towards Captain Newbold to do so, for there is no sort of doubt that, whatever the earth may be, he has discovered a new and a very remarkable mineral, which is a double *Sulphuret of Iron and an earth!* We must wait for larger specimens to decide what the earth is.

The locality of this mineral (which should have been noted at the beginning of the paper,) is in the central range of the Eastern Ghats, between Cummam in Cuddapah, and Gograpilly in Kurnool, a little south of the Cunnama pass. Captain Newbold says of it:—"The formation is the great diamond sand-stone which here passes into arenaceous and argillaceous slates. In the latter occur the veins in which the mineral are found, consisting chiefly of the carbonate of Cerium described in a former paper, in the Journal.

"It is associated with lead-ore (galena) which occurs in nests and



short seams, and the latter ore has in former times been diligently sought after by the natives. Numerous and half-choke up excavations are met with in the surrounding hilly jungly tracts, attesting a perseverance and spirit of research which is rarely met with in the present occupants of the soil.

“Near the Western mouth of the pass in the vicinity of Bussurapoor and Gograpilly, are a large number of old diamond pits, sunk in beds of ground evidently derived from the plumbiferous sandstone composing the adjacent Eastern Ghats. These gravel beds, from a careful examination of the pebbles composing them, appear to have been formed for the most part by aqueous causes no longer in action. The present insignificant streams that carry off the Ghat drainage could never have spread out to such an extent as these gravel beds cover, so large a quantity of transported and detrital matter. The large size of the pebbles, the depth and present situation of the diamond beds, all militate against the supposition of their being composed of recent alluvium or detritus, now in process of accumulation.”

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*Extracts from a letter from Capt. JAS. ABBOTT, descriptive of his Geological and Mineralogical Observations in the Huzaree district, dated Camp Puhli, in Huzaree, 19th June, 1847.*

I have now the pleasure to send you some specimens of what I conceive to be black iron ore, in small rounded masses of crystalline structure. I have with me no acids nor other tests, and my reason for supposing this an iron ore, is simply that the crystals are tetrahedral prisms, of dark brown color, and that the specific gravity seems to agree with that of the ore in question.

Whatever these ores may be, they occur in a very interesting formation of sandstone and blue mountain limestone, which commencing at the spur of a very lofty summit called Moachpoora, about 10 miles west of the Jelum, stretches W. S. W. about 40 miles, gradually dwindling in altitude and in the number of its parallel ridges, until from having been a triple mountain, it has become a single hill of trifling altitude, intersected at Margrella by the main road from Lahore to Attok.

At the south-eastern foot of this extended ridge, large boulders of iron ore are found intermixed with the debris of lime and sandstone of the

adjacent mountain. The iron ore is of the black kind, and I should suppose, from its specific gravity, tolerably rich in metal. The great abundance of wood and of limestone offers facilities for the establishment of a foundery,—a thing greatly needed in upper India, and the accessibility of the spot to wheeled carriage and the neighbourhood of the river Jelum at the town of that name, ensures the manufacturers the benefit of water carriage to Feeroozpoor, Loodiana, Bukhur and Bombay. This iron ore occurs in the main summit of the formation, Moachpoora, where Mr. Vans Agnew, in his late adventurous journey amongst the Dhounds, saw it worked after the rude fashion of the hill tribes.

The ridges of mountain to which I particularly allude as having been visited by myself, are called Serra. They are from 800 to about 2000 feet higher than the valley of Rawulpindi. The blue limestone is veined with vivid streaks of white, and is found in enormous masses as cliffs or disjunct rocks. It will take a good polish, and if worked, might supply the whole of our upper provinces, as well as the Punjaub, with marble chimney pieces, pavements, and material for monumtural sculpture. Water is very abundant, gushing in copious streams from near the summit, and of volume sufficient to turn the wheel of a saw-mill. The climate is singularly happy during the greater part of the year. The long mountain ridge intercepts the violent hot winds from the west, which on scaling its summit are tempered by the cooler strata above, and roll tumultuously down the eastern declivity, with the roar of a cascade; even then their force at that point is not very considerable. During the latter months of the rainy season parts of the hill skirt are considered unfavorable to health. Others, as Noorpoor Shahi, (a beautiful nook in the mountain) have a good reputation. The mountain itself, which is thickly wooded with box, barberry, wild pomegranate, and at the summit with fir, is habitable at a short distance from that point, and would afford a very cool residence. But the mountain is by no means worthy of recommendation as a general resort, the ridge being too sharp to afford building room and the spurs being short and abrupt. It has at present a bad name, as the resort of robbers.

From these mountains there ooze out three remarkable springs, one bearing upon its waters a scum of Asphaltum—another being impregnated with carburetted sulphate of iron, and the third having a mucilaginous consistence, being of the color of orange pulp, and if scented,

being rather pleasant to the nostrils. I express doubt, because the scent may perhaps have been derived from the bottle containing the liquid. Torches are made of the Asphalt. The second is drunk for indigestion. The use of the third is unknown. The latter I should have pronounced mucilage from decaying vegetation, had it not remained several days in a close bottle at a temperature of  $95^{\circ}$  without fermenting. The smell of the mineral water is scarcely sufferable.

From the occurrence of bitumen I have been led to anticipate the discovery of coal, and a day or two ago I stumbled upon a large boulder of crystals of lime containing lignite, of which I have the pleasure to send you a small specimen. This was in the Puhli valley Huzara, about 40 miles north of the mountains of Serra. Coal would be quite useless here, where wood is superabundant: but its position in any given country is always an important enquiry.

The stratification of this formation is nearly vertical. The course of the ridge an azimuth of about  $247^{\circ}$ . Eastward the ridges, which fall into the plains, were of sandstone, wherever I came in contact with them, from Rawul Pindi, to Noorpoor: a sandstone running in parallel ridges nearly vertical, filled with sandy debris, which when washed away by the torrents, leave natural walls of rock of the most singular appearance. In this sandstone I have never discovered traces of organic remains.

The supposed iron ore is found on hills formed of debris of the lime and sandstone rocks, and lying northward of the Serra Ridges, about a mile from the left bank of Hurroo river. I could not detect any strata, the masses seemed to be scattered at random through the soil. I collected about 5 or 6 lbs. of it in the course of an hour, with the assistance of my servants. But I should doubt there being any vein in that locality that would pay the working. It must be remembered that there are masses which have been washed out in the course of hundreds of years. If I can find means of packing the Asphalt, I will do myself the pleasure to send it you. It may possibly differ in some respects from the same substance elsewhere found. I fear the other liquids would not bear the carriage.

Mr. Vans Agnew, Civil Service, and Boundary Commissioner, has just left me on an expedition northward, which promises to be interesting to science. Lieut. Young of Engineers, accompanies him.

*Notice of the Cave Temples and Emerald Mines of Sakeyt, in the eastern desert of Egypt. By HEKEKYAN BEY.—Communicated by Captain NEWBOLD, M. N. I.*

The following notice of the temples and emerald mines of Sakeyt, was communicated to me by my friend Hekekyan Bey, late president of the Ecole Polytechnique at Cairo, and brother-in-law to the Pasha's minister—Artim Bey.

Hekekyan Bey was educated in England, is an accomplished English, French, and Italian scholar; and well acquainted with the Turkish, Persian, Greek and Arabic tongues. His attainments in Geology, Mineralogy, Mechanics and Natural Philosophy are very considerable, and he has lately been employed by the Pasha in superintending the researches for coal in Egypt. He is one of the Presidents of the Egyptian Society in Cairo, and distinguished as being the most zealous and influential patron of literature and science in the land of the Pharoahs and Ptolemies.

It is with much pleasure that I embrace the present opportunity of thanking him for the gratification and instruction derived in the many agreeable hours I had the good fortune to pass in his society during my residence in Cairo. The following notes are nearly literal extracts from his rough journal, which were kept in English and French; and daily written out with his own hand. He proceeded in June 1844, from the emerald, or rather chrysolite mines, of Zubára, described by other writers, to those of *Sakeyt*, distant about 12 hours' travelling by the *Rieh ul Allawi*, *Oum Gemil*, and the *Rieh ul Talik*. About seven hours from Zubára up a *Rhawdi*, on the right side of Wadi Gemil, he found the ruins of an ancient station, with cisterns, mills and old gold mines excavated in veins of quartz in mica slate.

The ruins of the ancient mining town of Sakeyt are scattered on the brows of hills of mica slate walling the valley, which is about 500 ft. broad, and runs N. N. W.—distant from the summit of Gebel Sakeyt about  $2\frac{1}{2}$  miles. There are here several rock cut temples; the principal of which is excavated in the schistose rock on the left side of the Wadi, and runs E. S. E., having a central altar at that extremity, on which is inscribed a triangle. The interior is whitewashed, and an illegible Greek inscription in red ochre is seen on the wall on the right

hand from the entrance; the interior measurements of the temple are about 50 ft. by 20 ft., eight feet high at the altar, and from 12 to 14 ft. high under the principal entrance. The doorways seem to have had doors or curtains and bars, once fixed to them. The workmanship is rude: from the position and general design of the temple its lateral chapels and central nave, it appears to have been once a Christian church.

About 400 yards lower down the same side of the Wadi, is another rock cut temple, much smaller in size, which contains the fragment of a Greek inscription cut into the stone along the cornice in its front.\*

ΡΩΝΙΟΥ ΕΥΧΑΡΙΕΤΟΣ  
ΚΑΙΤΙΣΙΑΙ ΚΑΙΤΩΑΠΟΛΛΩΝΙ ΚΑΙ  
ΝΑΟΙΣΕΘΟΙΣ ΠΟΙΚΜΟΙΕΡΟΝ

ΒΕΡΕΝΕΙΚΗΣ ΚΑΙΤΟ  
ΠΕΥΜΑΤΟΣ ΑΠΟ ΘΟΜ

The sign of a cross and a piece of a shell, such as are used in modern Greek churches, were found in the temple.

The ruins of houses are scattered around, constructed of fragments of mica schist, steatite, quartz in part coloured green by the colouring matter of the emerald, and containing crystals of emerald.

The mines appear to have been sold out to companies of adventurers, who built magazines and houses around the entrances of the excavations, of which several hundred still remain. In many instances, wherever the position of the quartz veins, and schists permitted, the whole face of a mountain has been quarried down and exposed to research.

The Zubára mines are galleries run into the mica schist; layers, containing nodules of emeraldine quartz, are often disposed so as to have a layer of quartz for their roof. At Sakeyt, on the contrary, the emeralds had been searched for in veins and layers of quartz, which is tinged purple, yellow, and red. The more transparent and white sorts, found in the debris thrown out by the ancient miners, exhibit the light bluish green of the Egyptian emerald. The schists and steatites are variously coloured, and mica occurs in golden scales. White, greenish,

\* The inscription contains apparently a dedication to the Egyptian goddess Isis and to the Greek god Apollo. The cross and shell indicate it having been subsequently used as a Christian chapel.—T. J. N.



black, light pink, and dark red coloured crystals occur as well as combinations of mica with quartz.

The schistose formations rest on the granitic: which last rocks have been made use of in the *cynocephali*, seen in the vicinity and lower down in the valley. These granitic rocks rise in elevations from 600 to 700 ft. above the surface of the valleys. They are overlaid toward the summit, by a layer of micaceous quartz containing a few emerald crystals: immediately over which is a kind of (argillaceous?) schist, whose super-crust is strongly ferruginous. A large mass of calcined iron stone indicates the ancient working of this bed for iron ore; which, probably, furnished the material for the tools of the workmen.\*

The mining district is confined to the hills which are enclosed in the basin of Wadi Sakeyt; and which are much lower than the high mural ridges forming the sides of the basin, and are of an irregular conical shape. They present parallel bands and waving lines of reddish quartzose matter and dark brown schists. The section of the hill over the temple presents,—in its lower portions—friable micaceous schists coloured with partial scales of iron ore; and covered with a tabular and highly sonorous bed of whitish brown quartz in parallel waved bands indicating volcanic or plutonic disturbance. There are no fissures in the curves.

Farther up the Wadi, rise hills of laminar talc with brown argillaceous layers: then mica schists of various colours, with crystallized garnet and quartz in needles. The highest summits appear to be of granite. The emerald is met with in the quartz debris of former mines, and occurs in crystals of a light bluish green attached to the quartz in mica schist.

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*Observations on the Language of the Goonds, and the identity of many of its terms with words now in use in the Telugu, Tamil and Canarese. By WALTER ELLIOTT, Esq., C. S., Madras.*

A paper by Dr. Manger, on the language of the Goonds, in the March No. of the Journal, offers some interesting grounds for ethnolo-

\* From the Cynocephali the Greek inscription and the Christian emblems found here it would appear that the mines have been worked from the era of the Pharoahs down to early Christian times.—T. J. N.



gical speculation. So long ago as 1812, a notice in the *Oriental Christian Spectator*,\* alluded to the discovery of Tamil and Canarese words in the Goand language, by Mr. Loesch, a German Missionary, who soon after fell a victim to the climate. The same subject was alluded to by Mr. D. F. McLoed, in a letter to the Secretary of the Asiatic Society, in 1844;† but until the present instance no vocabulary, it is believed, (with the exception of a short list in No. CXLV. of the Journal,) has been published, from which an opinion could be formed of the extent to which the admixture of the dialects of southern India, prevails in the present speech of these wild tribes.

A very superficial examination of Dr. Manger's list is sufficient to show that more than one half of the terms set down by him are identical with, or approximate very closely, to words now in use in the Telugu, Tamil and Canarese tongues. In a corresponding list which accompanies this paper I have noted such words as occurred to mind, and a more careful examination would doubtless elicit more.

The investigation of the different races that constitute the Hindu population of India has hitherto received less attention than the subject deserves. Beyond the fact that all the spoken dialects of India proper, are referrible to two great divisions, which the natives themselves recognize under the titles of Pancha-Goura, and Pancha-Dravira, —but little is known of the general relations and affinities of the people using them. According to Colebrooke, the central seat of the former was Canouj,‡ the capital of the Canya cubjas, from which point its cognate dialects spread both east and west, and then stretch far to the south and southwest, over Maharashtra, extending down the Malabar coast even to the vicinity of Mangalore.§ The southern dialects have generally been considered to commence from the neighbourhood of Beder, near which the limits of the Mahratta, Canarese and Telugu, meet. Dr. Manger's Vocabulary at once carries us to the Nurbudda, and it is not improbable that similar dialects may be discovered in the mountainous region on its northern band, and even in Buudeleund.

The first question that arises is, whether these two classes of languages indicate the contemporaneous existence of two great aboriginal

\* Vol. iii. p. 240.

† *Friend of India*, 1844, p. 203.

‡ Asiatic Researches, vol. VII. p. 220. Goand.

§ A dialect of Concani is spoken in all the tract north of Sadasheoghur, and Mahratta is the language of the mountains immediately above it.

racés inhabiting the northern and southern portions of India, or whether the people using the southern language at one time occupied the whole extent and were gradually driven southwards by the pressure of a new race of invaders from the north. The isolated existence of a cognate dialect of the south, among a wild tribe inhabiting unapproachable forests and fastnesses considerably to the north of the present range of these languages, is in favor of the latter supposition. But a single fact affords too narrow a basis on which to build so important a hypothesis.

The opinion of Mr. Colebrooke regarding the derivation of the Hindi or northern dialects from Sanscrit, has not found favor with Oriental philologists, and seems no longer tenable. But its influence on all the languages now in use, whether in the north or in the south bears incontestible evidence of the sway of a people vastly superior in power and civilization to the aboriginal races. All the written characters now in use, as has been proved by James Prinsep, have been derived from that source, and the very number of the letters, their classification and arrangement, are the same in all the languages of the north and of the south, except the Tamil, the most remote of the southern dialects. It is not only singular in wanting the regular series of aspirated consonants, but the number of simple consonants and vowels likewise falls short of those of all the others. It has besides, letters to express sounds peculiar to itself, and others which receive new powers by reduplication.\* This fact would seem to indicate the gradual retrogression of the great southern race to the extreme verge of the peninsula, where it preserves the most distinctive marks of its original character. But whether this was owing to the growth of the power and the extended conquests of the Hindi tribes or to the silent progress of the Bráhmical faith and literature, or, as is most likely, to both of these combined, —remains to be ascertained.

In looking at the comparative list of words it will be observed that a considerable number of Goand words† are derived from the northern stock, as was likely to happen from the influence of the surrounding dialects. But the same effect is observable even in Telugu and Cana-

\* Thus double rr and double dd become ti, double bb becomes pp, and double ss serves for ch.

† As *Boy, Girl, Horse, Ass, Goat, Twenty, Fifty, &c.*

rese, where Sanscrit terms,\* have in general instances superseded the original words. The influence of the Urdú on Goand is also perceptible in the ten Commandments, and Sand Sumjee's song, where we find such terms as *admee* man, *hazar* 1000, *kám* business, *labari-gohai* false witness, *khabar* news, *kuan* well, *tisra din* third day, *hath* market, *guttri* bundle, *ghossa laya* become angry, *pucha* question, *thera kya* established, and the particles *jub* when, and *keh* that.

The similarity of grammatical construction between the Goand and southern languages is apparent in many respects, but in this part the Vocabulary seems rather defective.

The plural is formed by the addition of *k* in Goand, and by *kul* and *gal* in Tamil and Canarese. The objective cases which terminate in *na* and *ni* in the former, are formed by *in* the genitive, and *nu* the accusative, in Tamil and in Canarese. The structure of the verb, as far as it can be learned from the examples given, also presents many analogies. The present and some of the other tenses in Goand are derived from the present and conjunctive participles without personal terminations, in this respect corresponding with the formation of the Malayalem verb, (Peet's Malayalem Grammar, p. 60.) which is also without inflections. The past and future tenses show some traces of resemblance to the Canarese and Tamil, both in their formation and in their personal terminations. The large employment of auxiliary verbs in the southern dialects is not perceptible in the Goand specimens of construction, unless it be in the formation of the passive by the use of *howe*.

These hasty remarks have been thrown together in the hope of showing how wide a field is open for further investigation, not with the idea of communicating valuable results. The Vocabulary and specimens are too scanty and imperfect to make the institution of more careful comparisons worth while at present. The Goand words too seem to have suffered considerable mutilations and changes at the hands of the printer, which renders it hazardous to venture on conclusions drawn from less obvious resemblances. It is to be hoped that more attention will be given to so interesting a subject, and the publication of a well selected Vocabulary† of terms for general adoption as promised by the Editors, will greatly facilitate the labours of future inquirers in this field.

\* As in *day*, *man*, *twenty*, &c.

† See foot note, p. 286.

N. B. The orthography of the words in the Southern dialects is according to Sir William Jones' system, now generally employed by all Oriental scholars. The Tamil *ḷ* is represented according to Ellis, by *zh*.

| English.  | Goandi.   | Telugu.               | Tamil.       | Canarese.               | Maratta. | Sanskrit. | Malayalem. | Todava.   |
|-----------|-----------|-----------------------|--------------|-------------------------|----------|-----------|------------|-----------|
| Head,     | Tulla,    | Tála,                 | Tálé,        | Tálé,                   | Kapal,   | ..        | ..         | ..        |
| Forehead, | Kuppar,   | ..                    | ..           | ..                      | ..       | ..        | ..         | ..        |
| Eyebrows, | Kunkunda, | Kanubóma,             | ..           | ..                      | ..       | ..        | ..         | ..        |
| Eyes,     | Kunk,     | Kannu,                | Kán,         | Kannu, vul-<br>go Kann, | ..       | ..        | Kán,       | Kón.      |
| Nose,     | Mussair,  | Múckú,                | Mucku,       | Mugu,                   | ..       | ..        | Mucka,     | Muttuvan. |
| Ears,     | Kohis,    | ..                    | Kadu,        | Kivi,                   | Kan,     | Karna,    | ..         | Kevvi.    |
| Mouth,    | Tudhi,    | ..                    | ..           | ..                      | Tond,    | Tunda,    | ..         | ..        |
| Teeth,    | Pulk,     | Pallu,                | Pallu,       | Pallu(A.C.)*            | ..       | ..        | Pallu,     | Purr.     |
| Throat,   | Gunga,    | Gontu,                | ..           | Gantlu,                 | ..       | Kant'ha,  | ..         | Kempakudr |
| Armpit,   | Kauku,    | ..                    | ..           | Kenkalu,                | Kakh,    | Kaksha,   | ..         | ..        |
| Stomach,  | Pir,      | Potta,                | ..           | Hotte,                  | Pot,     | Petari,   | ..         | ..        |
| Entrails, | Puddu,    | Pegu,                 | ..           | Potte(A.C.)             | ..       | ..        | ..         | ..        |
| Back,     | Murchur,  | ..                    | Mudugu,      | ..                      | ..       | ..        | ..         | ..        |
| Fect,     | Kal,      | Kalu, vul-<br>go Kal, | Kalu, ditto, | Kalu, ditto,            | ..       | ..        | ..         | ..        |
| A boy,    | Perga,    | ..                    | Payyan,      | Iludaga,                | Porga,   | ..        | ..         | ..        |
| A girl,   | Pergi,    | Pilla,                | ..           | Hudigi,                 | Porgi,   | ..        | ..         | ..        |
| Firewood, | Kuttia,   | Katte,                | Katti,       | Katigi,                 | ..       | Kasta,    | ..         | ..        |
| Salt,     | Sovur,    | Choundu,              | Ennie,       | ..                      | Soulu,†  | ..        | ..         | ..        |
| Oil,      | Ni,       | Nune,                 | Palu,        | Enne,                   | ..       | ..        | Enna,      | Encye.    |
| Milk,     | Pal,      | Palu, vul-<br>go Pal, | Palu, ditto, | Hal or Halu             | ..       | ..        | Pal,       | Port.     |
| Butter,   | Nemi,     | Venna,                | Venne,       | Palu (A.C.)             | ..       | ..        | ..         | ..        |
| Bullock,  | Koda,‡    | Kode,                 | Kedari,      | Benne,                  | ..       | ..        | ..         | ..        |
|           |           |                       |              | Hori,                   | ..       | ..        | ..         | ..        |

\* A. C. means an-  
cient Canarese, or the  
Hella Canada dialect.

† The correct word  
is "uppu," but the  
impure *Earth salts*  
generally used in the  
interior as a substi-  
tute, is called Sowla.

‡ A young bullock  
of 3 years old.



| English.              | Goandi. | Telugu.  | Tamil.                              | Canarese.  | Maratta. | Sanscrit. | Malayalem. | Todava. |
|-----------------------|---------|----------|-------------------------------------|------------|----------|-----------|------------|---------|
| Bambu,                | Wuddu,  | ..       | ..                                  | Biduru,    | Vélu,    | Vénu,     | ..         | ..      |
| Leaves,               | Aki,    | Aku,     | ..                                  | ..         | ..       | ..        | ..         | ..      |
| A tree,               | Murra,  | Manu,    | Maram,                              | Mara,      | ..       | ..        | ..         | ..      |
| A flower,             | Pungar, | Puvvu,   | Pá,                                 | Hú, Puvvu, | p'húl,   | ..        | Mara,      | ..      |
| A Tama-<br>rind tree, | Chitta, | Chinta,  | ..                                  | ..         | Chinch,  | ..        | ..         | ..      |
| Sagun tree,           | Teku,   | Teku,    | Teku,                               | Tegu,      | ..       | ..        | ..         | ..      |
| Peepul,               | Ali,*   | ..       | ..                                  | Arali,     | ..       | ..        | ..         | ..      |
| Not, No,              | Hille,  | ..       | Ille,                               | Ille,      | ..       | ..        | ..         | ..      |
| Yes,                  | Hinge,  | ..       | ..                                  | Honda,     | Hoyé,    | ..        | Ille,      | ..      |
| Before,               | Nunné,  | Mundara, | Munné,                              | Mundé,     | ..       | ..        | ..         | ..      |
| Within,               | Rupper, | Lopala,  | ..                                  | ..         | ..       | ..        | ..         | ..      |
| Between,              | Nuddum, | Naduma,  | Naduvé,                             | Nádu,      | ..       | ..        | ..         | ..      |
| Behind,               | Pija,   | ..       | Pinné,                              | ..         | ..       | Prishtá,† | ..         | ..      |
| Above,                | Parru,  | ..       | Inge,                               | ..         | ..       | Upari,    | ..         | ..      |
| Hither,               | Hickki, | Ikkada,  | Ange,                               | ..         | ..       | ..        | ..         | ..      |
| Thither,              | Haikki, | Akkada,  | Indruki pro-<br>nounced<br>Indsike, | ..         | ..       | ..        | ..         | ..      |
| Now,                  | Indike, | ..       | To-day,                             | Iga,       | ..       | ..        | ..         | ..      |
| When,                 | Boppot, | ..       | Eppo,                               | ..         | ..       | ..        | Eppoz,     | ..      |
| Here,                 | Iga,    | ..       | Inge,                               | Ille,      | ..       | ..        | Devasina,  | ..      |
| Daily,                | Dink,   | Dinam,   | ..                                  | Dina-dina, | ..       | ..        | Onnu,      | Won.    |
| One,                  | Undi,   | ..       | Onnu,                               | Ondu,      | ..       | ..        | Randu,     | Edd.    |
| Two,                  | Rund,   | ..       | Rendu,                              | Eradu,     | ..       | ..        | Munru,     | Mudd.   |
| Three,                | Mund,   | ..       | Munru,                              | Muru,      | ..       | ..        | Nal,       | None.   |
| Four,                 | Nalo,   | Natugu,  | Nalu,                               | Naku,      | ..       | ..        | ..         | ..      |
| Five,                 | Saiyan, | Edu,     | Eanye,                              | Eedu,      | ..       | ..        | ..         | ..      |
| Six,                  | Sarun,  | Aru,     | Aru,                                | Aru,       | Saba,    | Shat,     | Aru,       | Ore.    |

\* In Tamil the Ba-  
nian is ala.

† Pichi, (Hindi.)



| Seven,      | Era,               | Edu,        | Ezhu,   | Elu,                    | Sate,   | Sapta,    | Ezu,    | ..                            |
|-------------|--------------------|-------------|---------|-------------------------|---------|-----------|---------|-------------------------------|
| Ten,        | Pudth,             | Padi,       | Pattu,  | { Hattu,<br>Pattu.(AC.) | ..      | ..        | Pattu,  | Pottu.                        |
| Twenty,     | Visa,              | ..          | ..      | ..                      | Vis,    | ..        | ..      | ..                            |
| Fifty,      | Pannas,            | ..          | ..      | ..                      | Pannas, | ..        | ..      | ..                            |
| Hundred,    | Nur,               | Nuru,       | Nuru,   | Nuru,                   | ..      | ..        | Nur,    | { Onnur, i. e.<br>one hundred |
| A Horse,    | Kora,              | ..          | Kudera, | Kudere,                 | Ghoda,  | ..        | Kudara, | ..                            |
| A Man,      | Manda,             | Manushi,    | ..      | ..                      | ..      | Manushya, | ..      | ..                            |
| A field,    | Nole,              | Nela,       | Nelam,  | Nela,                   | ..      | ..        | Nelam,  | Nelan.                        |
| A she-goat, | Buckral,           | ..          | ..      | ..                      | Bakri,  | ..        | ..      | ..                            |
| A Boar,     | Puddhi,            | Pandi,      | Panni,  | { Ifandi,<br>Pandi,     | ..      | ..        | ..      | ..                            |
| I,          | { Nak or<br>Nanna, | { Nenu,     | Nan,    | ..                      | ..      | ..        | Gnun,   | One or On.                    |
| My,         | Nowa,              | Na,         | ..      | Nanna,                  | ..      | ..        | Enra,   | ..                            |
| Me,         | Nakum,             | Nannu,      | ..      | Nanna,                  | ..      | ..        | ..      | ..                            |
| Thou,       | Enna,              | ..          | Un,     | Ninu,                   | ..      | ..        | ..      | ..                            |
| Thy,        | Newa,              | Ni,         | ..      | Ninna,                  | ..      | ..        | ..      | ..                            |
| He,         | Wur,               | Wadu,       | Awan,   | { Awan,<br>Awar,        | ..      | ..        | ..      | ..                            |
| His,        | Wanna,             | Wani,       | Awanna, | Awanna,                 | ..      | ..        | ..      | ..                            |
| Him,        | Wunk,              | Wuni,       | Awanel, | Awanna,                 | ..      | ..        | ..      | ..                            |
| By him,     | Wunk sun,          | Wani cheta, | ..      | ..                      | ..      | ..        | ..      | ..                            |
| We,         | Wak,               | Menu,       | Nam,    | Nawu,                   | ..      | ..        | ..      | ..                            |
| Our,        | Wonan,             | Ma,         | ..      | Namma,                  | ..      | ..        | ..      | ..                            |
| You,        | Mekum,             | Miru,       | ..      | ..                      | ..      | ..        | ..      | ..                            |
| They,       | Wurg,              | Wuru,       | ..      | ..                      | ..      | ..        | ..      | ..                            |
| Their,      | Wurran,            | Wari,       | ..      | ..                      | ..      | ..        | ..      | ..                            |
| Them,       | Warran,            | Warini,     | ..      | ..                      | ..      | ..        | ..      | ..                            |
| By them,    | Warransum,         | Wari cheta, | ..      | ..                      | ..      | ..        | ..      | ..                            |
| She or it,  | Ud,                | Adi,        | Adu,    | Adu,                    | ..      | ..        | ..      | ..                            |

The following words are taken from the Ten Commandments and the song of Sand Sumjee.

| English.         | Goandi.     | Telugu.                 | Tamil.    | Canarese.                         |
|------------------|-------------|-------------------------|-----------|-----------------------------------|
| Name,            | Parral,     | Peru,                   | Per,      | Hesaru,                           |
| Mother,          | Awa,        | ..                      | Tai,      | Awa,                              |
| Elder brother,   | Tunna,      | Anna,                   | Anna,     | Anna,                             |
| Younger brother, | Tumma,      | Tamudu,                 | Tambi,    | Tamma,                            |
| Hear,            | Kuyat,      | ..                      | ..        | Kélo,                             |
| They heard,      | Kineh turg, | ..                      | ..        | Kelidaru,                         |
| To born,         | Wattoni,    | ..                      | ..        | Háttona,                          |
| Dead,            | Satur,      | Satchu.                 | Sattu,    | Sattu,                            |
| Having taken,    | Techi,      | Teechi, having brought, | ..        | ..                                |
| He shall take,   | Yetanur,    | ..                      | ..        | ..                                |
| Bringing,        | Pullana,    | ..                      | ..        | Tarona.                           |
| He put on,       | Yetum,      | Yetu,                   | ..        | Yeti kondan.                      |
| Ask,             | Keat,       | ..                      | Kelu,     | Kelu.                             |
| He said,         | Indal atur, | ..                      | ..        | Helida.                           |
| They asked,      | Keal atur,  | ..                      | ..        | Kelidaru.                         |
| Feeding,         | Thetana,    | ..                      | ..        | Tinsona.                          |
| A child or cub,  | Murri,      | ..                      | ..        | Mari.*                            |
| A puppy,         | Naipila,    | Kuka pilla,             | Naí kuti, | Nai mari.                         |
| Meat or flesh,   | Khandk,     | ..                      | ..        | Khanda, a morsel or bit of flesh. |

\* The term *mari* in Canarese expresses the young of any animal, while *kusa* in Can. and *pilla* in Telugu are exclusively applied to young child. The Goands seem to apply *murree* to the young of man and animals indifferently. See Sand Sumjee's song.

## NOUNS ARE THUS DECLINED.

|                 | Goand.                                       |                           | Canarese.                                                          |                                                        |                                                                   |
|-----------------|----------------------------------------------|---------------------------|--------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------|
|                 | Singular.                                    | Plural.                   | Singular.                                                          | Plural.                                                |                                                                   |
| 1st Declension. |                                              |                           |                                                                    |                                                        |                                                                   |
| Nominative,     | {<br>Kora,<br>Korana, or                     | {<br>Korank,<br>Korankna, | {<br>Kudare,<br>Kudareya,                                          | {<br>Kudaregalu,<br>Kudaregala,                        | {<br>Horse.<br>Of horses.                                         |
| Genitive,       |                                              |                           |                                                                    |                                                        |                                                                   |
| Dative,         | {<br>Koradd,<br>Koratu,                      | {<br>Korankun,<br>..      | {<br>Kudarege,*<br>Kudareyannu,<br>Kudareyinda,                    | {<br>Kudaregalige,<br>Kudaregalannu,<br>Kudaregalinda, | {<br>To a horse,<br>Horse,<br>By a horse,                         |
| Accusative,     |                                              |                           |                                                                    |                                                        |                                                                   |
| Ablative,       | Koratsun,                                    | Korunksun,                |                                                                    |                                                        | To horses.<br>Horses.<br>By horses.                               |
| 2d Declension   |                                              |                           |                                                                    |                                                        | * Pronounced hard as<br>in <i>get</i> .                           |
| Nominative,     | {<br>Gohk,<br>Gohkna,<br>Gohkun,<br>Gohksun, | {<br>No plural,           | {<br>Godhi,<br>Godhiya,<br>Godhige,<br>Godhi yannu,<br>Godhi inda, | {<br>..<br>..<br>..<br>..<br>..                        | {<br>Wheat.<br>Of wheat.<br>To wheat.<br>Wheat.<br>By wheat.      |
| Genitive,       |                                              |                           |                                                                    |                                                        |                                                                   |
| Dative,         |                                              |                           |                                                                    |                                                        |                                                                   |
| Accusative,     |                                              |                           |                                                                    |                                                        |                                                                   |
| Ablative,       |                                              |                           |                                                                    |                                                        |                                                                   |
| 3d Declension.  |                                              |                           |                                                                    |                                                        |                                                                   |
| Nominative,     | {<br>Pindi,<br>Pindena,<br>Pinditun,<br>..   | {<br>No plural,           | {<br>Pindi, or Pindi<br>yocka,<br>Pindiki,<br>Pindi,<br>Pindito,   | {<br>Telugu.<br>..<br>..<br>..<br>..                   | {<br>Otta or flour<br>Of otta.<br>To otta.<br>Otta.<br>With otta. |
| Genitive,       |                                              |                           |                                                                    |                                                        |                                                                   |
| Dative,         |                                              |                           |                                                                    |                                                        |                                                                   |
| Accusative,     |                                              |                           |                                                                    |                                                        |                                                                   |
| Ablative,       |                                              |                           |                                                                    |                                                        |                                                                   |

## PERSONAL PRONOUNS.

| Goand.         | English. | Telugu.    | Tamil.                  | Canarese.                 | Malayalem.              | Tulu. | Coorg.                 | Todava.             |
|----------------|----------|------------|-------------------------|---------------------------|-------------------------|-------|------------------------|---------------------|
| Nak, or Nanna, | I,       | Nenu,      | Nan,                    | Nanu,                     | Nyan,                   | Yanu, | Nan,                   | Won.                |
| Nowa,          | My,      | Na,        | En,                     | { Nanna, }<br>{ Enna, }   | Enre,                   | Yana, | Enna,                  | Enna.               |
| Nakun,         | Me,      | Nannu,     | Ennai,                  | { Nanna, }<br>{ Enna, }   | Enne,                   | ..    | Enna,                  | Enna.               |
| Naksun,        | By me,   | Nacheta,   | Ennale,                 | Nanninda,                 | Ennal,                  | ..    | { Ennam }<br>Gouda,    | Ennadd.             |
| Imma,          | Thou,    | Nivu,      | Ni,                     | Ninu,                     | Ni,                     | ..    | Nin,                   | Ni.                 |
| Niwa,          | Thy,     | Ni,        | Un,                     | Ninna,                    | Ninre,                  | ..    | Ninna,                 | Ninna.              |
| Nikun,         | Thee,    | Ninnu,     | Unnei,                  | Ninna,                    | Ninne,                  | ..    | Ninna,                 | Ninna.              |
| Niksun,        | By thee, | Nieheta,   | Unnal,                  | Ninninda,                 | Ninnal,                 | ..    | { Ninnun }<br>Gouda,   | Ninnidd.            |
| Wur,           | He,      | Wadu,      | { Avan, }<br>{ Awar,* } | { Avanu, }<br>{ Awaru,* } | { Avan, }<br>{ Awar,* } | ..    | Av,                    | Ad, he, she,<br>it. |
| Wunna,         | His,     | Wani,      | Avanudaya,              | Avana,                    | Avanre,                 | ..    | Avana,                 | Adana.              |
| Wunk,          | Him,     | Wanni,     | Avanai,                 | Avanna,                   | Avane,                  | ..    | Avannam,               | Ad.                 |
| Wunksun,       | By him,  | Wanicheta, | Avanal,                 | Avaninda,                 | Avanal,                 | ..    | { Avannam }<br>goud,   | Adanad.             |
| Mak,           | We,      | Memu,      | Nangal,                 | Navu,                     | Nam,                    | ..    | Eng,                   | Woun.               |
| Mowan,         | Our,     | Ma,        | Engal,                  | Namma,                    | Nammude,                | ..    | Engale,                | Enmadd.             |
| Makun,         | Us,      | Mammuna,   | Engalai,                | Nammannu,                 | Nangle,                 | ..    | Engale,                | Em.                 |
| Maksun,        | By us,   | Maeheta,   | Engulale,               | Namminda,                 | Nunnal,                 | ..    | Engale goud            | Emmadda.            |
| Imat,          | You,     | Miru,      | Ningal,                 | Nivu,                     | Ningal,                 | ..    | Ning,                  | Nim.                |
| Miwan,         | Your,    | Mi,        | Ungal,                  | Nimma,                    | Ningalude,              | ..    | Ningale,               | Nimma.              |
| Mekun,         | You,     | Mimmuna,   | Ungalai,                | Nimmana,                  | Ningale,                | ..    | { Ningalam }<br>goond, | Nimmana.            |
| Miksun,        | By you,  | Mieheta,   | Ungalal,                | Nimminda,                 | Ummal,                  | ..    |                        | Ninimid.            |

\* Used of dignified or respectable persons.

|                        |               |                                      |                      |                     |                   |    |      |     |
|------------------------|---------------|--------------------------------------|----------------------|---------------------|-------------------|----|------|-----|
| Wurg,                  | They,         | Waru,                                | Avargal,             | Avaru,              | Avar,             | .. | ..   | ..  |
| Wurran,                | Their,        | Wari,                                | { Avargalu-<br>daya, | Avara,              | Avarude,          | .. | ..   | ..  |
| Wurrun,                | Them,         | Warini,                              | Avargalai,           | Avaranna,           | Avare,            | .. | ..   | ..  |
| Wurrunsun,             | By them,      | Waricheta,                           | Avargatale,          | Avarinda,           | Avaral,           | .. | ..   | ..  |
| <i>Demonstrative.</i>  |               |                                      |                      |                     |                   |    |      |     |
| Yirg,                  | This,         | Idi,                                 | Idu,                 | Idu,                | Ida,              | .. | Id.  | ..  |
| Ad,                    | He, she, it,  | Adi she or it                        | Adu, it, that,       | Adu,                | Ada,              | .. | Ad,  | Ad. |
| Ten,                   | Him,          | { Tannu, re-<br>fective pro-<br>nom, | { Tannai,            | Tanna,              | ..                | .. | Tan, | ..  |
| Yirg,                  | These,        | Ivi, They.                           | ..                   | ..                  | ..                | .. | ..   | ..  |
|                        | <i>Goond.</i> | <i>English.</i>                      | <i>Telugu.</i>       |                     | <i>Malayalem.</i> |    |      |     |
| Imperative,            | Winka,        | Speak,                               | Wagu,                | Sound, prate,       | Para,             | .. | ..   | ..  |
| Infinitive,            | Wankuuna,     | To speak,                            | Waga,                | To prate,           | Parayun-<br>nadu, | .. | ..   | ..  |
| Present part.          | Wunki,        | Speaking,                            | Wagutu,              | Prating,            | ..                | .. | ..   | ..  |
| Past part.             | Wunktur,      | Spoken,                              | Wagina,              | Prated,             | Paranya,          | .. | ..   | ..  |
| Conjunc-<br>tive part. | Wunkei,       | { Having<br>spoken,                  | { Wagi,              | { Having<br>prated, | Paranyi,          | .. | ..   | ..  |
| <i>Present tense.</i>  |               |                                      |                      |                     |                   |    |      |     |
| Nunna                  | Nenu va-      | Nenu va-                             | I prate,             | Nanpara-            | ..                | .. | ..   | ..  |
| vunki,                 | gutanu,       | gutanu,                              | { Thon               | yunu,               | ..                | .. | ..   | ..  |
| Imma                   | Nivu va-      | Nivu va-                             | { pratest,           | yunu,               | ..                | .. | ..   | ..  |
| wunki,                 | gutuva,       | gutuva,                              | { He prates          | Avan pa-            | ..                | .. | ..   | ..  |
| Wur wunki,             | Vadu va-      | Vadu va-                             | { gutadu,            | rayiennu,           | ..                | .. | ..   | ..  |
|                        | Menuva-       | Menuva-                              | { We prate,          | Nam pa-             | ..                | .. | ..   | ..  |
| Mar wunk,              | gutamu,       | gutamu,                              | { You prate          | rayunnu,            | ..                | .. | ..   | ..  |
| Imar wunki             | Miru va-      | Miru va-                             | { Ningul pa          | rayunnu,            | ..                | .. | ..   | ..  |
| Warg                   | gutaru,       | gutaru,                              | { They               | Avan pa-            | ..                | .. | ..   | ..  |
| wunki,                 | Wuru va-      | Wuru va-                             | { speak,             | rayunnu,            | ..                | .. | ..   | ..  |
|                        | { speak,      | { gutaru,                            |                      |                     |                   |    |      |     |

- { *Goand.*—Sandsumjee, na saka.  
 { *English.*—Sandsumjee's song.  
 { *Canarese.*—Sandsumjee-ya Hadu.\*
- { *Goand.*—Sandsumjee, na saka kuyat ro Baban.  
 { *English.*—Sandsumjee's song hear, O Father.  
 { *Canarese.*—Sandsumjee-ya Hadu\* kelu Ele uppa.
- { *Goand.*—Sark ask kitur sing Baban hille puttur.  
 { *English.*—Six wives he took, Sing Baba not born.  
 { *Canarese.*—Aru hendarannu madicondanu Sing Baba Huttalilla.
- { *Goand.*—Yirrun ask kitur awite Sing-baban autarietur.  
 { *English.*—Seventh wife took by her Sing baba was conceived.  
 { *Canarese.*—Elne Hendati yennu madicondanu Avalu Singu babannu garbhadali dhariudalu.

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*Some notes on the Botany of Sinde, by Captain N. VICARY, 2nd  
European Regt.*

The following notes have been made from plants, collected under considerable difficulties, at seasons (Dec. Jan. Feb.) the worst that could be selected for collecting plants, or when I was accompanying an army in an enemy's country, with scarcely the means of transporting my private baggage.—I mention this merely to show that much remains to be done of botanical interest in Sinde, and that my collection gives but a limited, although a characteristic idea of the plants that flourish in that region. The Flora of Sinde falls naturally into three divisions, that of the hills, the plains, and the coast. The hills being either the bases or out-liers of the Hala range, are barren in the extreme, owing to the want of rivers, the rareness of natural springs, their saline nature where they do exist, and the absence of periodical rains.

Little that could be called soil exists; a few of the intervening valleys only are favored with arable land.

The hilly country generally presents a most desolate and barren appearance—little vegetation meets the eye—scarcely anything but the bare, broken, pale or rusty yellow Tertiary strata, of which they are composed. My Beloech guides informed me that rain at a proper season falls on an average about every fourth year, that shortly afterwards vegetation appears abundantly, and that on those occasions the Beloeches are in the habit of collecting and storing dried grass; at such seasons the botanist would doubtless find much to excite attention, but at any time the few plants found are very interesting.

\* Pronounced long.



A species of Palm is very abundant in this division, near springs and lining the banks of water courses. If not new, I believe it to be *Chamerops humilis*, but I have seen neither flowers or fruit. The tree has scarcely any stem above ground; the leaves are flabelliform, and the petioles channelled with lacerate stiff margins. The denuded and dry spadix of one tree which I saw was about 6 feet high, with numerous lateral branchlets. The Beloches, make sandals of the leaves of this tree. A *Viola* is found near water courses, nearly allied to if not identical with *V. patrinii*.

A species of *Reamuria*, with leaves differing somewhat from the described kinds, also exists on the tops of some of the lower hills. This, and a *Scrophularineous* plant (*Antiecharis*) are the most ornamental plants found in the lower Hialas.

A *Grewia*, allied to *G. sapida*, forms small shrubs rising from the fissures of the rocks; its small red berries are eatable.

*Orygia trianthemoides*, is found near the base of the hills, *Hep-  
tophyllum tuberculatum* in the upper valleys, and *Peganum Harmala* everywhere. I found *Tribulus alatus*, Del. and *Calligonum*, both Egyptian forms, at the base of the hills; a species of *Zygophyllum*, differing little from *Z. simplex*, is found forming dense matted beds near springs in the upper valleys. *Seetzenia*, a Sierra Leone genus, is abundant both in the hills and at their bases, also a new species of the Cape genus "*Mousonia*,"—*Neurada proeumbens*, an Egyptian or Arabian plant, is plentiful on the borders of the Sind desert, and also in the hills, is particularly plentiful too near Shahpoor on the western border of the desert. On the sand hills at the same place I found species of *Rhazya*; it is a pretty small shrub with so much the habit of the garden Oleander that our sepoy called it "*Bun Kunale*." It is also found throughout the hills but invariably in sandy places.

A species of *Forskalea*, with ovate leaves, is abundant in some places amongst the hills; the leaves of this plant adhere to everything with great tenacity and can only be removed piece meal; the whole plant is clothed with sharp hooked hairs.

A *Sophora*, with pretty yellow Laburnum-like flowers, is also found amongst rocks near water, accompanied by *Linaria ramosissima*, and a variety of *Lindenbergia urticæfolia*. Several species of *Salsolæ* are also abundant. One in particular in the hilly country with terete

pungent leaves, and axillary capitate inflorescence, of which unfortunately I am without specimens. A new species of the African genus *Limnium*, is also found on the skirts of the Halas. *Plantago amplexicaulis*, is found in the inner valleys along with *Haplophyllum*. An *Echium* of the Cape type, and possibly new, and *Trichodesma Africanum*, B. B. are abundant in the fissures of rocks midst the higher hills.

*Salvia primula*—*Ægyptica*, and a new species of the same section, are widely spread through the hills. A new *Linaria*, very like *L. triphylla*, is found from the base of the hills upwards.

*Solanum Forskalii*, or a species akin to it, is also abundant. *Hyocyanus muticus* is found in moist places. An *Asclepiad*, with the habit of *Orthanthera vininea*, is very abundant on the margins of water courses. It forms a large bushy shrub, and I suspect is the same plant described by my friend Dr. Falconer as "*Campelepis*." *Cometes Surattensis* is found occasionally along the whole base of the Hala mountains; a *Caralluma* or some nearly allied plant is abundant on the higher ranges, but I never saw it in flower; a new and pretty species of *Cleome* is found in the passes leading into the Hala range at a low elevation: with this I close my notice of the hilly region of Sind.

The plains of Sind are of a very variable character, some places being very fertile, and others barren, and naked desert with little to be seen except *Salsolea* and *Tamarisk*, and even these affect the borders of desert places.

The *Tamarisk* on the borders of the desert in some places yields a considerable quantity of manna, it exudes from the bark of the younger branches in the form of translucent tears. It is collected in some abundance in the neighbourhood of Meher, south of Larkhana, and used to adulterate sugar; my servants eat a considerable quantity of it without being in any way affected. In fact they were wonder-stricken and returned thanks to God for having miraculously created sugar in the desert jungle. I had about a seer of it for near a year, it remained unaltered, and was at last destroyed by exposure to rain.

This species of manna is noticed by Doctor Royle in his *Illustrations of Botany*, p. 214. I saw neither flowers nor fruit, so cannot speak as to the species, but the shrub has the habit and appearance of *T. gallica*.

The little desert of Sind flanks the base of the Hala range, varying from 10 to 25 miles (or more) in breadth, extending in a southerly direction to beyond Meher, where it narrows to three or four miles, and there are more or less extensive patches of desert nearly as far south as the Munchaul Lake. In a northerly direction branches of the desert extend to near Mittun Kote, flanking the base of the Boogtee Beloch Hills (spurs of the Halas) upon which Deyrah and Kahun are situated. This tract is sometimes called the Burshoree desert, from the name of a halting-place on the other side, N. W. of Shikarpoor. The soil is a hard baked yellow clay, often exhibiting proofs of lacustrine or alluvial origin, generally extremely arid and devoid of all vegetation. In some places even in the heart of the desert *Salsolæ* are abundant, in others the surface for miles is perfectly naked; in many places saline matter abounds, efflorescing and whitening the surface, or cementing the soil, which crackles under the feet as if icebound; saltpetre is or has been manufactured at the southern end of the desert. It will be seen that but for the Indus this desert would form a branch of the great Jeysulmeer desert, which in some places south of Bhawalpoor, approaches the Indus so closely that its sands are poured into the stream, hence we may expect the vegetation on the borders of both to be somewhat similar.

Not far south of Bhawalpoor a species of "*Anabasis*," very like (if not identical with) *A. florida*, makes its appearance; this plant abounds on the borders of the desert and on both banks of the Indus wherever the desert approaches.

The borders of the Sind desert are usually belted with sand hills, and outside them a belt of *Acacia catechu*, of greater or less breadth.

I have already noticed *Monsonia* as existing on the western borders of the desert, I also found it in desert places in lower Sind.

*Antichorus* (*Corechorus*) *depressus*, abounds on the desert borders, particularly at Khangurh; *Physalis somnifera* is also found here, and extends into the hill valleys. In lower Sind, south of Sewan, a species of *Euphorbia*, very like *E. pentagona*, abounds in many places forming impervious patches of jungle; near Kotree, and also between that place and Sewan I found an "*Ochradenus*," I believe identical with the Egyptian *O. baccatus*, *Delisle*. *Fagonia* is abundant throughout Sind,

both in the hills and plains, I have no specimens, but considered the species to be *F. Mysorensis*, the flowers are pale purple.

At Meher and some other places a species of sugar-cane is in cultivation, which I believe to be unknown in India; it is called "Buhadoo-ree;" the stems are slender and trailing; they grow to ten or fifteen feet in length, the base not being thicker than a finger; ten or twelve are usually fastened together so as to afford mutual support; the cane is said to yield the best sugar, but in small quantity. *Cleome ruta*, Jacq. is abundant on the rocks at Sukkur, and throughout Sinde. *Typha angustifolia* is found on most lands subject to the annual flooding of the Indus, and from it vast quantities of mats are manufactured. A species of *Adenantha*, I believe *A. pavonia*, is often found near villages in lower Sinde; this tree has a weeping habit, and at a distance looks not unlike *Salix Babylonica*. A remarkable species of *Acacia* is also found near villages. In its mode of growth and appearance it strongly resembles the funeral Cypress. The Sindians call it "Caubool-lee Baubool," a name which points to its foreign origin.

I was not fortunate enough to see this tree either in blossom or fruit. Between Kotree and Kurrachee I noticed a species of wild cotton trailing up trees to 20 feet; I was sick in a Doolce at the time and unable to take specimens.

*Dodonaea Burmanniana*, and I believe another species, are found in Lower Sinde. *Aristolochia bracteata* and a *Verbena* akin to *V. officinalis*, but perhaps distinct, exist on the smaller hills of lower Sinde; *Orthanthera viminea* abounds throughout Sinde and is a very useful plant; like many others of its order, the bark yields a strong fibre; in this shrub it is of greater length than perhaps in any other *Asclepiad*. I am not aware of the fibre being used by the Sindians, but the thin osier-like branches are bruised and twisted into a strong coarse kind of rope in common use.

There are also numerous well known Indian forms of plants in the plains of Sinde, particularly near the cultivated districts, of which I took neither notes nor specimens; the date flourishes in several parts of Sinde, but thrives best at Sukkur, and its vicinity, on both banks of the Indus. There are two varieties. One with pale yellow, and the other with brown fruit; the fruit is smaller than the Egyptian date, but when ripe is very palatable; only certain trees produce good fruit, about

a-third of the whole perhaps. The fruit of the remainder is injured by tapping for the juice, from which sugar is manufactured.

The plants of the coast are of a mixed and peculiar character, and many of them belong to more northern genera. *Serraea ineana*, Cav. grows plentifully on the sand hills of the coast; the only known species of this genus, is a native of Succotra, and is described as being only three inches high. The Kurrachee plant forms a bush two feet in height, and when in flower is very pretty; perhaps it may be a new species?

A very hoary *Atriplex*, not far removed from *A. verruciferum*, is also very plentiful; *Ipomœa bilobata* spreads over the sand in every direction, and *Scaevola Taccada*, Roxb. is abundant on the tops of the sand hills, the berry is white at first but turns purple when ripe. A new species of *Egialitis* is also found all along the coast, and a new shrubby plant of the *Paronychiæ*, with the bark and almost the leaves of an *Equisetum*.

*Cadaba Indica*? grows on the rocks at Minora point; I also noticed this plant in the Hala mountains, but am rather doubtful as to the species; I have only seen the cucumber-shaped fruit which is made into a pickle by the Sindians.

I shall now proceed to notice seriatim, such plants of my Herbarium as appear to me deserving of elucidation.

#### *Umbelliferae.*

Indigenous plants of this class are rare in Sindh; I have but one specimen from the Hala mountains which for the present I have referred to

1. "*Libanotus*;" the plant smells strong of *asafoetida*.

#### *Rhizophoraceae.*

I found a fresh flowering branch of a tree of this class floating in the surf on the beach at Kurrachee, but no where detected living trees.

2. It belongs to the Genus "*Cerriops*" of Arnott; the many mouths of the Indus will doubtless afford others of this order.

#### *Cruciferae.*

3. A species of *Farsetia* abounds from Bhawalpoor, throughout Sindh; it is often the only food procurable for camels, who eat it greedily, along with a frutescent *Crambe*? In the Hala mountains it is used for the same purposes. The plant of this order, along with some others, will form the subject of a future communication.



*Capparideæ.*

4. *Cleome ruta*, Jacq: Sukkur and other rocky places in Sindh. The petals are pink, and bear at base of each a fringed scale.

5. "*Cleome fimbriata*, Vic: lower hills in Sindh.

Stems and leaves hispid from gland-capitate stiff hairs; leaves all simple, lower ones long petioled, round-cordate, quintuple-nerved, outer lateral nerves lost in the margin, three medial nerves stronger and inarcuately reaching the apex. Upper leaves smaller, subconform narrower, subsessile, flowers pale purple? from the terminal axillæ; pedicels lengthening in fruit; calyx clothed with gland-capitate hairs. Sepals 4; subequal, lanceolate. Petals 4; shortly clawed with acute oblong-deltoid laminae, apices bearing out gland-capitate hairs, and ciliate with them. Bases toothed slightly on the margins and bearing above claw transverse free fimbriate petaloid scales. Fertile stamens 4, rather longer than petals, one anther larger, torn small. Ovary subsessile, linear, rather rough; style caducons, cylindric, short; stigma discoid, capitate. Capsule linear-cylindric furrowed on opposite sides, shortly stipitate, densely clothed with strongly stipitate, peltate glands, 1 celled, 2 valved, valves separating from the placentiferous narrow replum, seeds most numerous, cordiform, smooth, amphitropous. I have given my note of this plant, as it seems to be not far removed from *C. Droserifolia*, Del: and perhaps eventually it may prove to be the same.

6. *Cleome rupicola*, Vic: passes leading into the Hala range of mountains and lower hills.

This plant is not unlike *C. glauca*, Dec. Vol. I. p. 239, but the stems and leaves of my plant are clothed with scattered gland-headed hairs, and young branches are 4 angled. Leaves elliptic, ovate and obovate, petiolate, upper leaves reduced to linear-lanceolate bracts. Racemes often 6 inches long. Petals orange-rufescent, secund, smooth stamens secund, in an opposite direction to petals, 6; gland of the torus semilunate, siliques pendulous, falcate, flat, subsessile, 15 lines long, 2 lines broad, bearing some scattered capitate hairs; seeds densely beset with brown hairs, numerous.

7. *Cadaba Indica*? on rocks near Kurrachee and Hala mountains.

I am doubtful about this plant, having seen it only in fruit. The leaves near the apices of branches are often supported by two stipulary



thorns. The fruit is nutant, longly stipitate and cucumber-shaped bluntly trigonal, 3 to 4 inches long and turning red when ripe.

*Resedaceæ.*

8. *Ochradenus baccatus*, Delile, lower Sind. I believe this to be the Egyptian plant, although the Sind one differs in some trifling particulars; my specimens are not sufficiently advanced to show the spinifoliate habit.

*Violaceæ.*

9. *Viola patrinii*, D. C.; Kurrachee, and Hala mountains.

*Reamuriaceæ.*

10. *Reamuria Hypericoides*, Wild. Doz Akhooshtee, and spurs of the Hala mountains.

The leaves of the Sind plant are spatulate-linear and crowded to the ends of the branches.

*Sapindaceæ.*

11. *Dodonæa Burmanniana*, D. C. Lower Sind. This shrub is not more than three feet in height, with leaves about an inch in length, never more, and blunt cuneate-linear. I have some doubt as to the species; there is another in Sind of which I have no specimens.

*Malvaceæ.*

12. *Althæa pumila*, Vic: near Shikarpoor, plant herbaceous, from 6 to 10 inches.

Stems slender, stellately hairy, stipulæ ovate, leaves stellate, hairy on both sides, lower ones cuneate at base, palmately 3 parted with the lateral lobes bifid, the apices roundly tridentate, midlobe cuneate, the apex roundly 3—5 toothed. Flowers very shortly pedicelled, axillary, blue. Involucre 10 cleft with linear lobes. Calyx half, 5 cleft, with acute lobes; anthers about 10; styles 10, filiform. Stigmata capitate. Carpels arranged round a central shortly 10 winged columella, the apex of which is filiform, not marginate, transversely corrugate, 1 seeded.

13. *Pavonia odorata*, Wild. between Kurrachee and Hyderabad.

14. *Serræa incana*, Cav.; sand hills, Kurrachee. This plant is rather pretty when in flower, it forms small bushes about two feet in height. Anthers 25 to 30, stipitate, veniform, 1 celled, stigmata ciliate.

15. *Abutilon Indicum*, Sind and Hala mountains.

16. *Sida acuta*. Plains of Sind.

*Tiliaceæ.*

17. *Antichorus* (*Corehorus*) *depressus*, Linn.; Khangurh and borders of desert.

18. *Grewia sapida*? all hilly places in Sind. I have doubtfully referred this to *G. sapida*, but I suspect it is a very different plant, my specimens are not sufficient to determine; the petals bear a large scale at base and are bifid with toothed lobes. The berry is red and eatable when ripe.

*Portulacææ.*

19. *Orygia decumbens*, *Forsk*: eastern base of Hala mountains.

The sepals and petals are red, and the stems and leaves are often colored; this plant does not seem to differ much from *O. trianthemoides*, Heyne.

*Paronychieæ.*

20. *Cometes Surattensis*; all Sind.

*Rutacææ.*

21. *Peganum Harmala*; all Sind.

22. *Haplophyllum tuberculatum*, Andr. Juss: near Deyrah, Boogtee, Beloch hills.

*Zygophylleæ.*

23. *Tribulus alatus*, *Del*: eastern base of Hala mountains.

24. *Fagonia Mysorensis*; Sukkur and all Sind.

25. *Zygophyllum obtusum*, *Vic.*; valleys of the eastern slopes of Hala range; plants gregarious, herbaceous, decumbent, pale green. Leaves fleshy, simple, spatulate-linear, blunt, or rounded at apex, sessile and subsessile, stipulæ acuminate, scales at base of stamens deeply bifid. Capsule deeply 5 wing-lobed, 5-celled, each cell opening inwards with 2—3 pendent seeds. Flowers short pedicelled, yellow.

26. *Scetzenia lanatum*, Wild.; all rocky places in Sind. The stamens in the Sind plant are most certainly alternate with the sepals of calyx, and not opposite to them; some doubt may exist with respect to the identity of this plant with that from Sierra Leone, I therefore give my note of it.

Plant spreading, semi-erect, stems and branches flexuose, woolly at the joints within the stipulæ, younger branches under surface of leaves, and their margins papillose from sessile glands, otherwise smooth, leaves petioled, opposite, 3 foliate, midleaflet obovate, often retuse,

lateral leaflets oblique-ovate, all entire and shortly apiculate, stipulæ linear, often uniting with the margins of the stipulæ of the opposite leaf and thus appearing interpetiolar; flowers green tinged yellow, axillary, solitary, pedicels in fruit longer than the leaves. Calyx 5, parted with a valvate æstivation, lobes lanceolate, each bearing opposite its central base an adherent scale half its length and with free shortly fimbriate margins, stamens 5, hypogynous, opposite to the divisions of calyx, filaments slightly flattened, smooth, tapering, style 5-cleft almost to the base, with long linear terete lobes, stigmata capitate, rough, ovary oblong, 5-celled and ribbed. Ovula 5-pendent from the apex of columella. Capsule 5-furrowed and seeded, detaching from base into 5 cocci, and thus remaining for a long time pendent by short funiculi from the seeds to the apex of columella; the cocci are internally bivalved and perforated on the inner angles of apices for the passage of the funiculi. Columella persistent for a long time after the seeds have fallen, 5-angled, with the apex discoid, 5-lobed and with the placentæ in the sinuses between the lobes; seeds, brown, oblong, acute at both ends, with a scanty green arillus.

*Geraniaceæ.*

27. *Monsonia Asiatica*, *Vic.*: eastern base of Hala mountains and lower Sind.

I believe that this is the first species of *Monsonia* found out of Africa. The Sind plant belongs to the section "*Holopetalum*." Plant semi-erect, herbaceous, clothed everywhere with long, white, silky hairs; leaves long-petioled, cordate-ovate, blunt, irregularly dentate, 7-nerved, stipulæ herbaceous, linear-lanceolate; peduncles slender, 2—5 flowered, with from 4 to 6 unequal linear bracts at apex, pedicels slender, flowers blue. Calyx sepals apiculate, 3-nerved, petals entire, stamens pentadelphous in a double series. Capsule very longly rostrate.

*Rosaceæ—Sub-Ord. Neuradææ.*

28. *Neurada procumbens*, *Lin.*: borders of Sind desert, at base of Hala mountains, and near Shahpoor. This curious plant has heretofore been noted as a native of Egypt, Numidia and Arabia.

*Leguminosæ.*

29. *Sophora tomentosa*, *Lin.*? At Coombe in the Boogtee Beloch hills, a shrub of 4 feet.

30. *Crotolaria arida*, *Royle*: borders of desert.

31. *Crotolaria oxalidifolia*, Vic. : eastern base of Hala range. Prostrate or semi-erect, with branches from 6 to 8 inches long, all parts clothed with appressed strigose hairs, stipulæ lance-linear, adnate; leaves petioled, 3 foliate, leaflets shortly petiololate, midleaflet obcordate, lateral leaflets oblique, obovate, blunt, peduncles slender, leaf opposed, legume sessile linear, trigone-hairy, 9-seeded and constricted between the seeds.

32. *Taverniera nummularia*, D. C. ; Hala mountains, near Deyrah.

33. *Alhagi maurorum*, *Tourn* ; Sinde passim.

34. *Cassia obovata*, *Collad.* Sinde passim ; this plant is also abundant in the Punjab.

35. *Adenanthera pavoniana* ? Near villages, cultivated ?

Plants of this order are comparatively rare in Sinde ; my herbarium contains only four others, and two of these are *Indigoferæ*.

#### *Urticaceæ.*

36. *Forskalea ovata*, Vic : Hala mountains. Plant rising erect to two feet, all parts clothed with sharp hooked hairs, leaves alternate, triple-nerved, white, tomentose beneath excepting the nerves, lower ones broad ovate, upper ones ovate, all narrowed at base into the petioles and grossly dentate ; involucre of 4—7, linear spatulate lobes. This plant comes near *F. tenacissima*, and perhaps may be a broad-leaved, variety of it ?

#### *Aristolochiaceæ.*

37. *Aristolochia bracteata* ; Lower Sinde.

#### *Chenopodiaceæ.*

38. *Salsola Indica*. Sinde desert and Halas.

39. *Salsola stricta* ? Upper and Lower Sinde.

40. *Anabasis florida*, M. B. Borders of Sinde desert, and banks of Indus to near Bhawalpoor.

41. *Atriplex verruciferum*, M. B. ? Sand hills near Kurrachee. I have doubtfully referred this as above, but it is probably a new species. The whole plant is lepidate-hoary and shrubby. Leaves short petioled, oblong, ovate, and obovate, blunt, narrowed at base into the petioles, lower leaves often remotely toothed. Upper leaves entire, valves of fruit orbicular with reflexed entire margins, and subcordate bases, lepidate otherwise smooth. Stamens of the male flowers 5.

*Phytolaccaceæ.*

42. *Limeum obovatum*, *Vic.*: skirts of the Hala mountains near Kotree; roots ligneous, descending deep into the soil, stems herbaceous prostrate, minutely pubescent. Leaves cuculate obovate, and ovate, obtuse with a point, minutely pubescent, flowers leaf opposed. 3—5 together, very shortly pedunculate, pedicels minutely bibracteolate. This plant comes near *L. Capense*.

*Polygonaceæ.*

43. *Calligonum polygonoides*? All Sindh. The specific characters of this curious genus are founded on peculiarities of the fruit; unfortunately I have never seen the fruit of our Sindh shrub, and have merely referred it to *C. Polygonoides*, because that plant makes a nearer approach in habitat to Sindh than *C. Pallasia*. This shrub is common throughout Sindh, and is found on the banks of the Indus nearly as far up as Bhawalpoor; near Shahpoor, at the eastern base of the Hala mountains, it is most abundant, forming small trees of 10 or 12 feet high, with a diameter of 6 to 10 inches at base; when in full flower it looks rather pretty.

*Menispermaceæ.*

44. *Cocculus laevis*? D. C.; lower Sindh.

*Myrsinaceæ.*

45. *Ægiceras fragrans*, *Kon*: mud flats Kurruchee harbour.

*Convolvulaceæ.*

46. *Ipomœa bilobata*; sand hills, Kurruchee.

47. *Convolvulus lanuginosus*, *Desr.*: Hala mountains.

48. *Convolvulus parviflorus*, *Vahl.*; base of mountains.

49. *Breweria evolvuloides*? *Chois.*; Hala mountains. As I feel considerable uncertainty about this plant I add my note.

Shrub erect of 1—2 feet, stems slender ligneous, all parts densely clothed with a sericeous pubes. Leaves very shortly petioled, elliptic, upper ones lanceolate, entire, mucronate and emarginate from the reflexed mucro, triple-nerved, pubes more dense beneath. Flowers axillary, 1 to 3 together, subsessile. Calyx persistent, not enlarging, with 2 linear bracts at base, sepals, 3 exterior and 2 interior, a little shorter, lanceolate acute, hairy out. Corolla with a deeply 5 lobed limb, the lobes hairy out. Stamens scarcely exserted, filaments broad at base with 5 short teeth alternating, anthers reniform-cordate, ovary 2-celled,



ovulæ 4, styles 2, divergent, filiform, stigmata discoid orbicular, continuous (not peltate). Capsule chartaceous, dry hairy towards apex, longer than the dry calyx, 2-celled, sept membranous, 4 valved, seeds from 2 to 3, oblong, black, very minutely scrobiculate, of a nutty hardness.

50. *Evolvulus linifolius*, base of Halas.

51. *Cressa Cretica*, Var : Indica ; all Sindh.

*Scævola*æ.

52. *Scævola Taccada*, Roxb. tops of sand hills near Kurrachee.

*Plantagin*æ.

53. *Plantago amplexicaulis*, Cuv. Hala mountains.

*Plumbagin*æ.

54. *Ægialites obovata*, Vic. : sand hills, Kurrachee, shrub of 2 feet, stems ligneous, annulate with the ensheathing bases of fallen leaves, densely foliaceous upwards, leaves blunt cuneate-obovate, retuse, glaucous hoary, smooth, articulated to the sheaths at base, spikes paniculate, flexuose, terminal flowers secund, utriculus bursting at apex into 5 short acute teeth.

*Boragin*æ.

55. *Heliotropium Rotleri*. Kurrachee.

56. *Echium*? Hala Range. I am unable to refer this to any of the many described species, and therefore attach my note.

Plant fruticose, erect, about a foot in height, growing from fissures in rocks. Younger stems, leaves and calyces densely clothed with short appressed strigæ. Leaves 5—6 lines long, ligulate-linear, blunt pointed, sessile, alternate. Racemes simple, many flowered; flowers solitary, sessile, secund, bluish white, bracts like the leaves but smaller, bractcolæ none, pedicels short, adherent to rachis for half their length. Calyx with blunt linear unequal segments (sometimes only 4, the fourth broader); corol tube 10-nerved with a ring of hairs within at base, smooth in the middle and the fauces closed with hairs which indistinctly form 5 very small tubes between the anthers; lobes of limb patent, blunt ovate, slightly auricled at base (one lobe often broader). Margins minutely and remotely toothed. Stamens not exsert, filaments very short, anthers mutic, linear oblong blunt and undivided at base, style shortly exsert, its base becoming angular in seed; stigma peltate capitate with two minute central points, acheniæ rather smooth with



an incurved point, one or two, often only one maturing, attached to base of style, perforation at base oblong triangular.

57. *Trichodesma Indica*, Sindh passim.

58. *Trichodesma Africanum*, R. B. ? Hala mountains.

I have referred this to the above with some doubt; it has the same prickly hispid habit, but differs in some particulars; plant growing from fissures in rocks, erect, 1 to  $1\frac{1}{2}$  feet. Leaves and stems dark green, hispid from hard white prickles bearing calli, leaves opposite at the divisions of the racemes, otherwise alternate, upper leaves subsessile, lanceolate, acute, prickles longer on the margins and midrib beneath. Racemes lax, the lower ones from opposite axillæ upwards, from alternate axillæ and terminal; peduncles usually 3-flowered, lengthening with the enlarging calyx in seed: bracteolæ none; calyx rigid, hairy, 5-angled with rounded auricellæ, segments acute, corol blue with caudate lobes, stigma simple, blunt, pedicels lengthened with the much increased and nutant calyx in seed, acheniæ 4, subtrigonal; the outer faces concave, marginate, the margin acutely serrulate with slightly glochidate teeth.

My specimens do not exhibit the lower leaves.

#### *Labiatae.*

##### *Salvia.*

59. *Salvia Egyptica*, *Linn.*: slopes of Hala mountains.

60. *Salvia pumila*, *Benth.*: slopes of Hala mountains.

61. *Salvia Halaensis*, *Vic.*: slopes of Hala mountains. Plant of 10—12 inches, erect, old stems ligneous, younger stems obsoletely 4-angled, densely clothed with short hairs, and sessile yellow glands,—leaves much corrugated, cordate-ovate, and broad ovate, blunt or rounded; slightly winging the short petioles, and often forming 2 lateral denticulæ at their apices; margins undulate lobate-crenate. Racemes 2—3 inches long, dense flowered subspicate; flowers blue, solitary, almost sessile; floral leaves small, bractea-formed, ovate, entire, hairy and longly ciliate, bracteolæ nearly as long as bracts; linear-lanceolate, hairy; calyx lanatopilose, enlarging and becoming nutant with the lengthening pedicel; upper lip shortly tridentate; the midtooth smaller, all acute, lower lip 2 part with linear filiform lobes. Corol, upper lip erect, short, bifid; midlobe of lower lip orbicular emarginate.

The acheniæ of this plant give out much mucilage in water.

*Verbenaceæ.*

62. *Verbena officinalis*? Spurs of the Hala mountains, Lower Sinde. I have referred this doubtfully to *V. officinalis*. The foliage of my specimens is from the ends of the flowering branches. The leaves are petioled, opposite and alternate, both surfaces shortly pilose, ovate and broad-ovate, blunt or emarginate, 5-nerved, margin serrate with the three serratures at apex larger.

*Scrophularinæ.*

63. *Linaria sindensis*, *Vic.*: Base of Hala mountains, Upper and Lower Sinde. This plant is extremely like *L. triphylla*. Herbaceous, stems procumbent, or semi-erect, 8 to 10 inches; leaves scattered, solitary, glaucous, entire, ovate narrowed into and winging the petioles; apices soft-pointed; young leaves often shortly pubescent; flowers purple tinged, yellow, subsessile, axillary, solitary, bracteolæ none; upper lobe of calyx foliaceous, broad-ovate, greatly exceeding the other 4; linear lanceolate lobes, lower stamens with their anthers united; stigma simple; capsule obliquely globular, 2-celled, upper cell abortive, lower cell many-seeded, bursting irregularly; seeds conic. Testa spongy, furrowed.

*Linaria ramosissima*, *Wall.*: Hala mountains; the Sinde plant is softly pilose, in other respects it is the same.

*Anticharis*. *Endlich*: Hala mountains.

*A. Viscosa*, *Vic.*: This plant belongs most certainly to *Endlicher's* genus, and probably to the very species, but as I have no means of referring to the specific characters given, I have allowed my Herbarium name to stand for the present.

The Sinde plant is so viscous that everything adheres to it. Flowers blue, leaves ovate-lanceolate, narrowed into the short petioles; pedicels short, minutely bibracteolate above the middle seeds; truncate oblong, longitudinally grooved with minute transverse striæ.

*Solanaceæ.*

*Solanum Forskalii*, *Dun*: cordatum, *Fors*: Hala mountains; both species appear to be different forms of the same plant; our Sinde plant is sometimes prickly, sometime not, the leaves are variable also. Stems slender; prickles both curved and straight, near the ends of the branches only; young shoots and leaves starry pubescent, old leaves smooth, round-cordate or subcordate at base, narrowed into the petioles; mar-

gin entire or occasionally sinuate toothed flowers rather longly pedicelled, blue; the corol greatly exceeding the half 5 cleft calyx; berry red, smooth rather, larger than a pea.

*Physalis sonnifera*, var *flexuosa*, all Sind, and Hala mountains.

*Hyocyamus muticus*, *Lin.* Hala mountains.

*Apocynaceæ.*

*Rhazya stricta*, *Decaisne*. This shrub is abundant in the Hala mountains, and at their eastern bases, but particularly at Shahpoor. It usually grows upon sandhills, and has somewhat the habit of our garden *Oleander*, but does not rise to more than three feet. The flowers are pale blue turning white by age. There is a small entire margined nectarium.

*Asclepiadeæ.*

*Periploca aphylla*, *Dec.* Bot. *Jacq.* All hilly parts of Sind.

This is my friend Dr. Falconer's *Campelepis*. *Ann. Nat. Hist.* Vol. X. page 362. This shrub abounds in the Boogtee Beloch hills near Deyrah.

The habit is that of *Orthanthera Viminæa*; the branches are devoid of all pubes. The leaves are linear lanceolate (not ovate,) and are seen only on the young surculi. The flowers are of a dark dull red colour; the long uncinatè filiform processes of the faucial corona, are inflected over the genitalia in the earlier stages of the flower, but subsequently become reflexed through the divisions of the corol. The pollen of this plant requires to be re-examined in the fresh flowers: in my opinion it not only differs from that of *Periploca*, but from the pollen of every genus of the order.

*Orthanthera Viminæa*. All Sind.

With few exceptions the above noted plants are foreign to our Indian Flora, flourishing between the parallels 25° and 30° N. Lat. or nearly equivalent to the tract between Allahabad and Hurdwar. At first sight it appears strange that so many northern forms should exist in Sind in excess of those found between the same parallels in India, but a slight examination of the countries forming our northern frontier will I think sufficiently account for it. The Himalaya mountains, the Hindoo Coosh, and probably the Tukt-i-Sullecmaun range, form an impassable barrier to certain classes of plants, but the lower ranges of the Hala mountains, which in many places are not more than 1,500 feet above the sea, offer no such obstacle; besides this there is the coast line, which with its constantly drifting sands offers a facile mode of trans-

mission to seeds ; thus we find several Egyptian, Arabian, Persian and African plants in Sindh ; that they have not spread into India seems also easily accounted for. The Indian desert of Jesulmeer proves in a south eastern direction a sufficient preventative. The course via the banks of the Indus is to a narrow extent only open to the north-east, and accordingly we find some Egyptian forms extending to Delhi and its neighbourhood, as has been remarked by my friend Doctor Royle in his illustrations of Indian Botany, p. 70, and p. 160.

*Salvadora persica*, *Capparis aphylla* and *Farsctia*, are found throughout Sindh ; however *Giseckia* so abundant near Ferozepoor, is not found in Lower Sindh ; *Orobanche Calotropidis*, *Edgew* : is found from Umballa to Kurrachce, and is extremely abundant in Lower Sindh ; the flowers of this plant are changeable, being blue at first and becoming pale yellow, hence two varieties have been supposed to exist. No scitamineous or orchideous plant exists in Sindh ; of the latter order *Zeuxine* is sparingly found under the Tamarisks, nearly as far as Subzulkote, following the course of the river.

The coast line alluded to above offers no obstacle to the diffusion of plants in a southerly direction via Cutch and Goozerat towards Bombay, but as yet these countries, the Delta of the Indus and the south-western tail of the desert are botanically unknown ; in the other direction a botanical excursion to Sommeeanee Bay or farther if possible, would serve to connect our Indian flora with that of Africa, Persia and Arabia.

I have still some curious Sindh plants of which I hope to give an account hereafter.

*Subathoo, 27th September, 1847.*

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*Reply to the Minute by Capt. MUNRO, regarding the MS. of the  
"Burnes drawings."—By E. BLYTH, Esq.*

*To the Secretaries of the Asiatic Society.*

GENTLEMEN,—As it has been deemed expedient to publish in the 'Proceedings of the Society' the minute by Capt. W. Munro, reflecting (as I cannot but think) with very undue severity on the mode in which I have prepared the descriptive letter-press to illustrate the lithographed drawings of the late Sir A. Burnes. I must now request that you will permit me to be heard in reply, and that you will favor me by awarding the same publicity to this letter as has been granted to the aspersions in question.

In the first place, I know nothing of any remuneration that was ever promised me for executing the task that was assigned to me; the sum of Co.'s Rs. 3,200 which I have since received from the Society, was for arrears of an additional hundred per month of salary, withheld until I had completed the said letter-press, as some inducement for me to undertake a labour for which it was believed I had no particular liking. It was well known that I had strenuously and consistently opposed, from the first, *and considerably to my own disadvantage*, any outlay of money upon the publication of what I have always regarded and repeatedly averred to be a series of drawings *possessing not the slightest scientific value*; but on this subject I need merely refer to my letter published in the Society's 'Proceedings' for October 1845, and here repeat my regret (for which I have now a further pecuniary reason) that, as the recognised zoological officer of the Society, it was not deemed necessary to consult me in a single instance about even the selection of the drawings for publication, whence some of the very worst are amongst those upon which the expense of lithography has been incurred, the worst alike for execution, for representing the most familiarly known European species, and *in several instances* different drawings representing the same species! I conceive that I should have been greatly remiss in my duty to the Society if I had not uniformly endeavoured to oppose so wasteful an expenditure of money, as the enormous outlay upon these "trashy" drawings is now admitted, on all hands, to have been: but, gentlemen, I wish it to be recorded, that instead of having benefited to the extent of Co.'s Rs. 3,200 for preparing the letter-press to accompany the publication of those drawings, as would be inferred from perusal of Capt. Munro's minute, the small increase of pay that had been allowed me for nearly three years previously was withdrawn, not in consequence of any dissatisfaction felt towards myself, but because of the impoverishment of the Society *resulting from the outlay of which I was so long the sole opponent, as I am now the only personal sufferer from the retrenchment!*

Capt. Munro expected that I should have "zealously undertaken an essay on the animals of Afghanistan and neighbouring countries"—"considering a large and distinct remuneration" was expected. Of the latter I need say no more: and as regards the former, Capt. M. happened to be unaware that I had such an essay in a forward state of preparation, the ornithological portion of which had long since been sent in; but that it had been suggested by the Senior Secretary of the Society that nothing of the kind was required, and that it would be sufficient if I simply identified the species, as far as was practicable.\*

\* This suggestion was only made in March, 1847, when I found the Society unanimous in their resolution not to publish the plates.—W. B. O'S., Sen. Secy.



Of my execution of this labour, Capt. M. remarks—"All that seems to have been done consists in guessing at the names of a number of animals, intended to be represented, in a series of bad drawings, with scarcely any original information regarding these animals. The little that has been done has been but slovenly executed," &c. Really I cannot imagine what else could have been done, or expected, under the circumstances; having, in the great majority of cases, no further data than the said "bad drawings" to build an opinion upon,—to "guess" at as I best might. Neither do I see much advantage in amplifying the notices of common and well known species, merely for the sake of filling out the page; nor even in imparting valuable information about rare species in a work which, as I had every reason to infer, was destined to be all but suppressed. Unhappily, the MS. notes of Dr. Lord, which would have afforded some assistance, had unaccountably disappeared from the Society's Rooms:\* and the specimens collected by the party were few and mostly valueless.

The most useful to me amongst the latter were some of the fishes procured; and without these it would have been impossible to determine certain of the species with anything like precision. Whoever reads Capt. Munro's brief paragraph on this class will assuredly do me the injustice to infer that I am indebted to my friend Mr. McClelland "for the short notes attached to this portion of the drawings" (the *Afghan* fishes? or the fishes generally? vide minute): the fact, however, being that my attempts to ascertain the numerous species figured, from very insufficient data in most instances, cost me much tedious labour; and but a small residue of them remained for determination when I consulted Mr. McClelland on the subject. That gentleman very obligingly rendered me all the assistance in his power, and I trust that I have sufficiently acknowledged the aid which I derived from him; and moreover that I am not exactly to blame for obtaining assistance from every available quarter.

So with the reptiles. Very truly—"The names of the snakes have been guessed at in a most haphazard way." For the simple reason that there was no alternative in the matter. Not having a single book treating on the *Ophidia* in the Society's library, except Russell's 'Indian Serpents,' the

\* Although nominally under my charge, they were virtually in the same keeping as the other books in the Society's library; and thither I returned them as often as I had had recourse to them, and on no occasion took them out of the premises. I could have had no reason for ever doing so, as my custom has always been to work solely at the Museum: but why so unpretending a small volume of MS. should have been abstracted from the place, in preference to others of bazar value, I own to some difficulty of understanding.



nomenclature of which is now antiquated, I consulted a gentleman well known for his attainments in this branch of Zoology, in the presence, too (as it happened), of another eminent naturalist, W. H. Benson, Esq.; and may remark that the name *Acrochordus*, with a mark of doubt, was not of my suggestion; nor that pl. XLII, fig. 2, represented the young of pl. XLI, fig. 1, though I still entertain the opinion that it does so. The supposed *Dipsas* I so assigned, with a note of interrogation however, from its general resemblance to the common *D. trigonatus*, combined with the fact of the head being expanded as usual in this genus: but where figures are admitted to be "bad enough to favor any guess," a less harsh tone of criticism might, I think, have been advantageously adopted, and even a private suggestion or two might have been offered and thankfully responded to, as a preferable mode of promoting the interests and the harmony of the Society.\*

The birds treated of are numerous, and I believe are all correctly assigned; but unfortunately I made the one sad oversight of writing *Grus cinerea*, Linn., instead of *Grus cinerea*, Bechstein; an error which I could scarcely have failed to rectify when correcting the press, and which assuredly is made the most of by Capt. Munro, by the mode in which he has notified it. He says—"Grus was not a genus, nor *Ardea cinerea* a species, of Linnæus." I think, however, he will find that the latter is a particularly well known species so named by Linnæus, though not referring to the *Grus*; which name seems to have been first used in a generic sense by Mœhring. Again, I need scarcely say I knew well that *Capra ægagrus* was Gmelin's species, and

\* I quote here all that I deemed it necessary to write of the four snakes particularly referred to by Capt. Munro, who, after complaining of my guessing what they were, proceeds to offer a few guesses himself!

"Pl. XLI, fig. 1. *Acrochordus*? *Bamoo-ee*, or *Dwo-moo-ee*. It is not possible to determine what this snake is, without a knowledge of the actual species. Perhaps it may be a large *Typhlops*.

"Pl. XLII, fig. 2. *Acrochordus*? This is probably the young of the species represented in pl. XLI, fig. 1. The originals of both figures were procured at Issakhai.

"Pl. XLIII, *Dipsas*? *Tropidonotus*? It is not possible to determine what this is meant for, without a specimen for reference. It is probably a *Dipsas*? Procured in the Derajat.

"Pl. XLIV, fig. 2. *Dipsas*? *Alteran-nag*, or *Gorah-dang*. Probably the young of the species figured in Pl. XLIII. This and the next were procured at Bulhawall-pore."

Surely it is much better to express doubt in such cases than to pronounce dogmatically? Of myself, I would not have undertaken what I consider such useless labour, as to attempt to determine species so wretchedly represented, the scutation, for instance, being expressed by simple cross-lines.

not Pallas's; and I venture confidently to assert that I should (in all probability) have corrected this inadvertence as well as the other. It is my general practice to look carefully over all matters of this kind when I receive the printed proofs for revisal; and I do not think that trivial errors of the sort are very often to be met with in my published papers. Indeed, with species so familiarly known as the above two are, it is a mere matter of form to cite the name of the author of the nomenclature; and I maintain that it is *most unfair*, on the part of Capt. Munro, to argue that the laboured part of the MS. was carelessly executed, because notices of such species as the common European Crane were written out of hand, and I chanced to say "*Grus cinerea*, Lin.;" the identification of the bird remaining, of course, unaffected.

Capt. Munro himself commits a little oversight of the kind, when he says—"The name of pl. II, fig. 3, can at best be but a guess," &c. &c. He alludes to pl. III, fig. 3, (this, however, may be a misprint :) but there is more serious reason to complain of his mistaken surmise about the *guess-work*, when, if he had taken the trouble to read what I had written on the subject, he would have found the words—"Identified from a skull, with the skin and fur on, among the specimens transmitted to Calcutta by Sir A. Burnes:"—there being, besides, another and perfect skin belonging to Capt. Hutton in my possession at the time I wrote this, and which I have by me to this day. I am entitled, therefore, to retort that Capt. Munro's minute is carelessly and hastily written, or he would not have made such a misrepresentation.

"Pl. IV, fig. 2," he says, "has no trouble taken with it, although it is supposed to be a new species." This is another mistaken surmise, on the part of Capt. Munro. I gave the subject full consideration: and having satisfied myself that the *ensemble* of its characters accorded with those of no described species of *Mustela*, I deemed it sufficient to say—"This species should be distinguished by the uniform whiteness of its under-parts and limbs, and rather lengthened tail having no black at the extremity;" which, with the coloured figure before the reader, marked "*Mooshkoormah*, nat. size one foot long," is, I still think, amply sufficient. I should be sorry, however, to found a name upon such a figure, and merely marked it thus—"Mustela—?"

Respecting the *Moosh-i-baldar* of Nijrow, plates VI and VII, I beg leave to retain the opinion I expressed, that it is *probably* a new species (vide also Journal for August last, p. 866). I think it probable that I have seen more specimens of *Sciuropterus fimbriatus* than my friend and old correspondent Prof. Schinz of Zurich, whose recently published work on the mammalia, referred to by Capt. Munro, is not in the Society's library, nor was there a copy of it in Calcutta at the time I wrote the notice referred to. It would therefore have been more friendly, on the part of Capt. M., to have called

my attention to M. Schinz's description of *Sc. fimbriatus*; and it would surely have been more satisfactory to himself to have examined the specimens of this animal in the Society's Museum, and to have personally compared them with Burnes's figure of the *Moosh-i-baldar*, than to have resorted to any mere description whatever.

Had Capt. M. also done me the honour to have looked over my tolerably large collection of carefully executed original drawings of wild Goat and Ibex heads, embracing every species known, except *C. caucasica*,\* *C. sibirica*, and *C. pyrenaica*, (of which two latter also I could have shown him M. Schinz's published figures, that gentleman having favored me with a copy of his memoir on these animals, and at the same time—1840-1—received from me his first intimation, with tracings of my drawings of the horns, &c., of the existence of the Himalayan Ibex, and I believe the Afghan Markhore, with different wild Sheep,) he would have given me credit for being a little more conversant with the group—in common with the other groups of *Ruminantia*—than he seems to be aware of. I have indeed bestowed much attention upon the different species of wild *Capra*: and on reperusing what I have written respecting the *Booz-i-koh*, am still of opinion that it more resembles the *C. himalayana*, nobis, apud Schinz† (vel *C. sakeen*, nobis), of the N. W. Himalaya, as where the Indus breaks through the chain, &c. &c., represented in summer dress, than any other known species. *Agagrus* it cannot be, for the horns are knobbed as in *C. ibex*; and it certainly is not *C. sibirica*; and I further adhere to what I wrote of *C. sakeen*, that—"This differs from the Alpine Ibex in possessing a well developed beard: the horns also attain a greater length than in that species, and, in general, attenuate much more towards their tips, being also less widely divergent; as fully described in the 'Proceedings of the Zoological Society' for 1840, p. 80, where the dimensions are given of a pair measuring  $4\frac{1}{4}$  ft. over the curvature.‡ A corresponding difference is observable in the horns of the females of these two Ibexes." &c. &c. Having said this much, I believe I have pointed out all the differences that exist between the Alpine and Himalayan Ibexes; and I deem it unnecessary to enumerate the characters that are

\* I have drawings of the horns referred to *C. caucasica* by Mr. Gray, in his 'Catalogue of the specimens of mammalia in the British Museum:' but I consider these to belong, decidedly, to *C. agagrus*; and suspect that those of *C. caucasica* will prove to be allied in form to those of *C. walie*, Ruppell, of the snowy heights of Abyssinia.

† I have no recollection of employing this name for the animal, but might have done so in the course of my correspondence with Prof. Schinz, at a time when I had no idea of visiting India.

‡ The description referred to was by myself, and I have now two drawings of the specimen in different aspects of view.

common to both, which any good description of *C. ibex* will supply : as in the particulars in which other species differ from the one, they will also differ from the other,—the horns and beard of course excepted, being the only known discrepancies between the two.\* Capt. Munro's remark that the drawing I suggested to represent the female of *C. megaceros*, Hutton (v. *Falconeri*), from comparison of it with Capt. Hutton's description of that animal, should (as its native name implies) be considered rather as the female of the Ibex figured, I willingly bow to as a just piece of criticism, in contrast, I am sorry to think, with all the rest.

From the whole tone of this minute, it is perfectly clear that Capt. M. laboured under the erroneous impression that a large sum had been promised to me for the performance of a certain task, and that I had not given the Society the worth of their money ; and this it seems to be his object to show

\* In *C. ibex* the beard is constantly reduced to a mere rudiment, that must be looked for to be observed (much as in Ruppell's figure of *C. walie*) ; while in *C. saikeu* it forms a large and conspicuous tuft, as in *C. agagrus*, *C. jüla*, and others. In *Proc. Zool. Soc., loc. cit., supra*, it is mentioned that the Himalayan Ibex is very closely allied to the Swiss one, having a similar rudimental beard, and colouring, *so far as I could learn* : and acting upon the information supplied to me, in both cases, I mentioned in a letter to the Secretary of the Zoological Society, written on board ship, and published in their 'Proceedings' for Aug. 10, 1841, that the Nilgherry Ibex had "a considerable beard, in which character" (misprinted *characters*) "it differs from the Himalayan Ibex." This passage Capt. Munro has cited. Further, in corroboration of the statement of my fellow passenger Lieut. Beagin, I find that Dr. Baikie, in his 'Observations on the Nilgherries,' p. 45, after describing a specimen of the female of the so called Nilgherry Ibex, adds—"The male at a distance appears at least six inches taller, nearly black, with very large knotted horns, and a long black or brown beard," &c. &c.—On the other hand, Mr. Jerdon assures me that the so called Ibex of the Nilgherries is no other than the *Kemas hylocivus*, Ogilby, or *Capra worryatoo* of Gray (vide *J. A. S.* XII, 181, *bis*) ; which animal I believe to be erroneously assigned by Mr. Gray to Nepal, as formerly to Chittagong, and that it is quite peculiar to the Nilgherries. It is not an Ibex, but akin to the *Tehr* (or *Jharal*) and to the *Goral* of the Himalaya. In these animals, the horns are not elongated as in the true wild goats, nor have they any trace of beard on the chin ; and they are very remarkable for possessing four developed teats, whereas all the nearly allied animals have but two. (I do not consider *Nemorhædus* as being nearly allied to them). As for the Himalayan Ibex, I find from examination of specimens, that I was erroneously informed respecting the non-development of its beard. In the head of a young male, belonging to Major Broome, now in the Museum, this measures 4 inches in length.—*P. S.* In a letter just opportunely received from Mr. Jerdon, that naturalist remarks—"Of course there is no such animal as Baikie's [Nilgherry] Ibex with knotted horns and a beard ; though I have heard some sportsmen speak of a beard, yet not one was ever produced that had one."

very unsparingly. The Society is, of course, right in expecting the highest amount of qualification from its scientific officers: but it is for the members of the Society to consider what they give in return for such proficiency, and what advantages their Museum and Library afford for *isolated study*, unaided as in Europe by the friendly intercourse of numerous fellow students of the same subject, who mutually impart much valuable information one to another, and by the great facilities afforded otherwise in various ways.\* It is for them also to consider how much discouragement is involved in the *slight* offered to an officer from whom so much is expected, by allowing him no voice whatever in advising the Society respecting the selection of plates for publication, which he is called upon to illustrate; though by regarding which, they might at least have chosen the better of two drawings of the same species for publication, instead of going to the expense of lithographing both, and have avoided that expense in numerous other cases where the commonest European species were badly figured. There are few, I think, but will allow that I have little cause to be satisfied with any part of my connexion with this unfortunate publication, now so decried, though formerly so highly eulogized; and the minute which I have now essayed to reply to is a fitting conclusion to the former history of all that relates to myself in connexion with the undertaking. In affording me, however, a plea and an occasion to express my sentiments freely, in this matter, I have perhaps no reason to be dissatisfied that it has appeared in the Journal. While confined to a private circulation among the members of the Society, I thought it preferable to remain silent, and spend my time more profitably to the Society than in controversy of any kind; but now that it has gone forth to Europe and the world, in the pages of the Journal, it becomes incumbent on me to have a due respect for my own reputation, by meeting the charges made against me, as I trust to the satisfaction of the Society. An opposite course would imply my acknowledgment of the justice of the criticism.

I have the honour to be,

Gentlemen,

Your's very obediently,

E. BLYTH.

*Asiatic Society's Rooms, Sept. 11th, 1847.*

\* For example, how much precious time is here lost in the determination of genera and species, which, with collateral information on the superior groups to which they belong, may be learned at a glance at the specimens in any well arranged museum of adequate extent, where each branch of Zoology (for instance) has its own particular superintendent.



*Report of Curator, Zoological Department, for September 1847.*

The following specimens have been received since the last meeting of the Society.

1. From Lieut. Strachey, 66th N. I. A package containing three skins of Tibetan animals, that had been long overdue, having been lying for some months in the premises of a mercantile firm in Calcutta. Under such circumstances, it is rare that skins of animals escape becoming utterly ruined by insects; but the present instance affords an exception to this very general rule, as the specimens are as free from injury as when they were packed. They are as follow:—

An imperfect skin of a blackish or *melanoid* variety of the Tibetan Wolf, designated *Lupus laniger* by Mr. Hodgson. Together with it, and in illustration, I exhibit an equally black Jackal, presented to the Society some time ago by W. Seton Carr, Esq.; and we have another common Jackal of a light rufous sandy colour, which variety is not very rare in the neighbourhood of Calcutta, upon the opposite side of the river only. The dark Wolf-skin has the head imperfect, and is mutilated of the paws and brush; but the muzzle and ears are present, sufficing to remove any doubt that might have arisen otherwise respecting the identification of the skin as that of a Wolf. It is a particularly beautiful specimen, or would have been so if perfect. The melanism consists in the much greater admixture of black than usual in the fur, giving the predominant tone of colour; the whitish being most apparent on the sides of the body. The ears are wholly black; the face and limbs chiefly so, or suffused throughout with fuscous, having a few whitish hairs intermixed; and there is a conspicuous ridge of lengthened black hair along the spine, much developed posterior to the shoulders,—the same hair as is found in all other Wolves, but appearing in them whitish with black tips only. A corresponding dark variety of the European Wolf was denominated *Canis lycaon* by Linnæus: and such variation of colour is less unusual in the Wolves of Arctic America.

For comparison, I also exhibit three fine stuffed specimens of Tibetan Wolves in their normal colouring, and a particularly fine stuffed specimen of a European Wolf, from Norway. An Indian Wolf I have never yet been fortunate enough to procure for the Society, though so common on the plains of Hindustan. According to Mr. Hodgson, the Tibetan race “has the general form of the European Wolf; but its colour is very different, and it has more elevated brows, larger ears, and a much fuller brush. Its pelage is also dissimilar and unique.” On comparison of the Society’s specimens, it will be seen that the brush of the European Wolf is fully as fine as (if not



finer than) that of either of the three Tibetan specimens; and the ears measure the same: but the Tibetan is a much slighter animal than the European Wolf, with considerably smaller paws. Its pelage is finer and softer, rather longer, but certainly not more dense and woolly next the skin; and the general tone of colour is much paler, this arising, however, in a great measure, from the considerable diminution of the number of black-tipped hairs on the sides (in most specimens), and their total absence—or nearly so—on the limbs; the distinct black streak in front of the fore-limbs of the European Wolf, as of the Jackal, being but very slightly indicated in the majority of individuals of the Tibetan Wolf, and in some specimens not at all. European Wolves vary a good deal, in some being much more fulvescent than others, or having the black tips and markings more developed: and the same variation occurs in the Tibetan race; the fulvous of the European Wolf being replaced by a delicate light isabelline, or rufous cream-colour, which prevails on the neck, upper-half of limbs, shoulders, and saddle (where mixed with the usual long black-tipped hairs); and the ears of some are conspicuously bright light rufous, while in others this colour is paler, and more or less mixed with black, as in European specimens. The pale colour of the Tibetan Wolf is in conformity with that of many other animals of the same region, as the Foxes, Bear, Ounce, Lynx, &c., and the Leopard when inhabiting near the snows. Comparing the skull of a European Wolf with four skulls of Tibetan Wolves (presented by G. T. Lushington, Esq., IV, 56), the most marked difference consists in the superior development and elevation of the super-orbital process in the latter; the muzzle, too, is somewhat broader in the European, and its teeth are decidedly larger and more robust;\* the *ensemble* is sufficiently different to enable one who has examined them together to pronounce, I think, with confidence in which of these regions a Wolf-skull had been procured; but individuals of each race differ to that extent that we should not be too hasty in assuming any particular distinction as absolute and invariable. Specimens of Wolves from other parts of middle and northern Asia require to be extensively compared, ere the vexed question of specific differences or identity can be determined with so much as an approximation to probability. Nevertheless, the analogy afforded by the adjudged distinctness of the Bear, Ounce, and Lynx, of Tibet—not to mention other instances, is in favor of the Wolf also being a peculiar species, though distinguished in a less marked manner from its nearest affines. For the present, however, I think we can only venture to regard it as *Canis lupus*, var. *laniger*, (Hodgson.)

\* I observe remarkable difference, however, in this respect, between the different Tibetan Wolf skulls.

*Felis uncia*, Lin. A flat skin, perfect, with the unfortunate exception of the four paws, of which it is mutilated. Another and finer Ounce skin was some time ago sent us by Mr. Lushington, similarly imperfect.

*F. isabellina*, nobis, n. s. The Lynx of Tibet. An imperfect skin, which I exhibit together with three other specimens of Lynxes from Tibet, and with three from Norway,—the latter being of the species referred to *F. lynx*, L., by M. Temminck, and which is termed *F. virgata* by M. Nilsson. The difference of colour of the Tibetan from the ordinary European Lynx is much the same as with the Wolves of the two regions: the Tibetan animal exhibiting a deficiency of colour; and the markings also are much less brought out, in the summer pelage, than I have seen in specimens of the ordinary European Lynx. A distinction, however, which I cannot help regarding as specific exists in the very much larger naked pads of the feet and toes, at all seasons, in the Tibetan as compared with the European Lynx; in the latter those of the toes are even discovered with difficulty, amid the very long fur that completely conceals them; whereas in the Tibetan species these pads are large and prominent, and the fur between them is short and close, and does not conceal them at all. In other respects, the two animals bear much resemblance, except that (so far as can be judged from skins only) the Tibetan would seem to be a taller and more slender species. The ears and tail are shaped and coloured as in the other; but the ear-tufts of the Tibetan Lynx would seem to be always more developed, measuring 2 inches and upwards in length. The fur varies much, according to season. In one specimen before me, in full summer dress, the pelage is short, and of an uniform dull sandy-brown colour, deeper and more rufous along the back, where grizzled with whitish-tipped and also some black-tipped hairs, which on the sides are diffused more scantily: the lower-parts are white, with (as usual) some scattered dusky spots; and there are some not very conspicuous markings of a deeper hue outside of the limbs: face and *mouchetures* as in the European Lynx. Another and mounted specimen is much paler, a light isabelline hue predominating; and at a proper distance and angle of vision, the Ocelot-like markings of the European Lynx in summer may just be made out upon the sides of the croup, and the spots on the limbs and sides of the body are comparatively distinct; the blackish bars on the inside of the fore-limbs being well developed. The winter dress is of a nearly uniform fine rufous cream-colour, or isabelline, below the surface, but showing more or less; the hairs whitish-tipped with black at the extreme tips, producing a somewhat grizzled appearance; the isabelline hue underneath being much less deep than in the European Lynx, in which the colour is rather a full rich orange-brown: sides paler and longer-haired, as usual, and the colour purer, passing to white underneath, intermixed with black hairs that grow

on the spots, but which latter have hardly that appearance. For several specimens of this animal, those of the Wolf, and of various other Tibetan mammalia, the Society is indebted to the repeated contributions of G. T. Lushington, Esq., of Almorah.

2. Mr. E. Lindstedt. A selection of bird-skins procured in the neighbourhood of Malacca. Among them is a fine specimen of *Cuculus sparveroides*, which I had never before seen from that part,—also beautiful specimens of *Hemicercus javensis*, *Campephilus validus*, *Tiga Rafflesii*, *Gecinus malaccensis*, *G. (?) rubiginosus*, *Sasia abnormis*, *Tchitrea affinis*, *Eupetes macrocerus*, *Lanius tigrinus*, *L. superciliosus*, *Enicurus frontalis*, *Orthotomus edela*, &c.; with a newly hatched specimen, in spirit, of *Python reticulatus*, (Schneider). The *Gecinus (?) rubiginosus* (Eyton, v. *Picus melanogaster*, A. Hay), is, I may remark, allied in structure and colouring to *G. (?) pyrrhotis*, (Hodgson.) and with it might form a distinct named subdivision. The Malayan specimens which I have hitherto referred to *Lanius phœnicurus* (v. *melanotis*, &c.), I now believe to be females or imperfectly mature males of *L. superciliosus*; and though quite undistinguishable from *L. phœnicurus* of India, the latter nevertheless does not ever assume the broad white forehead continuous with the eye-streak, nor the uniform rufous of the upper-parts, characteristic of the adult male *L. superciliosus*. Lastly, respecting *Tchitrea affinis*, A. Hay, XV, 292, I may notice that subsequent observation of numerous specimens has fully confirmed the propriety of separating this bird from *Tch. paradisi*: I have traced it from Sikim to Arracan, the Tenasserim provinces, and Malayan peninsula; but without the local variation which I formerly indicated (p. 473 ante), as Malayan specimens have sometimes all the tail-feathers conspicuously black-edged throughout their length, while others have scarcely more of this black edge than in *Tch. paradisi*. The inferior size, and the much shorter and different-looking crest, afford invariable distinctions, however, by which *Tch. affinis* may be recognized apart from *Tch. paradisi*. One of Mr. Lindstedt's specimens of the former species, in the white plumage, differs from all others I have seen of either species, in having the next pair of tail-feathers to the middle pair considerably lengthened, measuring 7 inches, while the middle pair are  $14\frac{1}{2}$  inches.

A Malacca collection lately received by Mr. Frith comprises the following species of birds, which I take the present opportunity of noticing. *Spizaetus nipalensis*, (Hodgson,) of Bengal, in the wholly black plumage; distinguished by its superior size and merely rudimentary top-knot from the nearly allied, but distinct, *Sp. caligatus*, (Raffles,) of Malacca;—and *Bulaca indrani*, (Sykes,) of India: neither of which species I had previously seen from the Malayan

peninsula; where the beautiful *B. seloputa*, (Horsf., v. *pagodarum*, Tem.), was procured by Dr. Cantor. The following Kingfisher is new.

*Alcedo nigricans*, nobis. This approaches *A. grandis*, nobis, in size, having the wing  $3\frac{3}{4}$  in., and bill from gape  $2\frac{3}{8}$  in. Colour much as in the allied species, as *A. ispida*, &c.; but the blue reduced to a few not very bright spots upon the crown and wings only, upon a fuscous ground; the scapularies being wholly fuscous, without a tinge of blue or green: but the middle of the back and rump are bright verditer, as usual; and the upper tail-coverts incline to indigo: loreal spot, patch on side of neck, breast, flanks, and lower tail-coverts, deep ferruginous; the throat, front of neck, and middle of belly, rufescent-white: ear-coverts dull rufous, each feather tipped with dingy blue; and the moustaches fuscous, similarly tipped with dingy blue. Upper mandible black, and the lower coral-red, in the specimen.\*

*Batrachostomus affinis*, nobis, n. s. Very similar to *B. javensis*, in the plumage figured by Dr. Horsfield (and which is considered to be the young dress of *Podargus auritus*, Tem.),† but smaller, with no white spots on the wing, nor pale spot-like bands on the tertiaries and caudal feathers; but the former are uniformly freckled over with dusky specks, and the latter present a series of obscure freckled bands, seen best at a little distance: throat and breast plain rufous, with a few white feathers having a subterminal dusky border on the fore-neck and sides of the breast only. Rest as in *B. javensis*, juv. Length about 9 in., of wing  $4\frac{1}{2}$  in., and middle tail-feathers the same. This is the small Malayan species which I formerly considered might be

\* I have now before me the following Asiatic species of restricted *Alcedo*.

1. *A. grandis*, nobis. Wing  $3\frac{3}{4}$  in.; bill to forehead 2 in. Like *A. ispida*, but the coronal spots of a paler and different blue, and no rufous on the ear-coverts. From Darjeeling.

2. *A. nigricans*, nobis. Malacca.

3. *A. ispida*, Lin. Afghanistan.

4. *A. bengalensis*, Gm. India generally, Malayan peninsula.

5. *A. moluccensis*, nobis. Ear-coverts dark blue, and bill much deeper than in the last; the blue of the upper-parts very splendid, and of quite a different tint from that of either of the other species.

6. *A. meninting*, Horsfield: *A. asiatica*, Swainson. Malacca, Java.

7. *A. biru*, Horsfield. Java.

Among all these species, the nearest approximation exists in the case of *A. ispida* and *A. bengalensis*, which differ only in *A. ispida* being rather larger. The rest are well distinguished one from another.

† A specimen in the *auritus* plumage, from Java, was presented to the Society by that of Batavia; and we have one in the dress figured by Dr. Horsfield, from the Malayan Peninsula, presented by F. Russell, Esq.

*Podargus stellatus*, Gould, *P. Z. S.* 1837, p. 43 : but it does not accord with the description of that species, and its dimensions are rather superior.

*Todichampus varius*, (Eyton,) XV, 11. The young of this beautiful species have the mantle and wings dark green, with a terminal pale fulvous spot on each feather, imparting a pretty speckled appearance.

3. From Major Jenkins, Gowhatti. Some skins of *Anatidæ*.

4. Mrs. Ashburner. A pair of living *Anser cygaoides*, from China.

5. Mr. J. R. Bell. A fresh head of the *Jannupári* Goat, with ears 17 in. long, when fresh.

6. J. Maxton, Esq., Police Surgeon. A fresh-laid egg of the *Grus anti-gone*. This was unfortunately pilfered by a Monkey, who had broken loose, but not before I had taken a coloured figure and description of it. Length  $3\frac{3}{4}$  in. by  $2\frac{3}{4}$  in. where broadest ; the small end narrowing considerably. Colour pale greyish-blue, scantily sprinkled over with specks and small blotches of rufous-brown, more numerous at the large end.

7. James Hume, Esq. The skin and skeleton of a *Python molurus*, L., 14 ft. in length, killed on the reed-covered alluvial island formed near the right bank of the Hooghly, nearly opposite to Fort William.

8. Dr. Thorburn, Goalpara. A collection of sundries.

9. Mr. Birch, of the Pilot Service. A living young example of *Viverricula malaccensis*, and various specimens of Crabs, &c.

10. Capt. R. Rollo, 50th Madras N. I. Three living Tortoises, from Vizigapatam, of the species *Testuda stellata*, Schweiger, v. *T. actinoides*, Bell, Dnm. and Bibr. *Hist. Rept.* II, 66.

11. Baboo Srináth Mittra. A couple of young Cobras.

E. BLYTH.

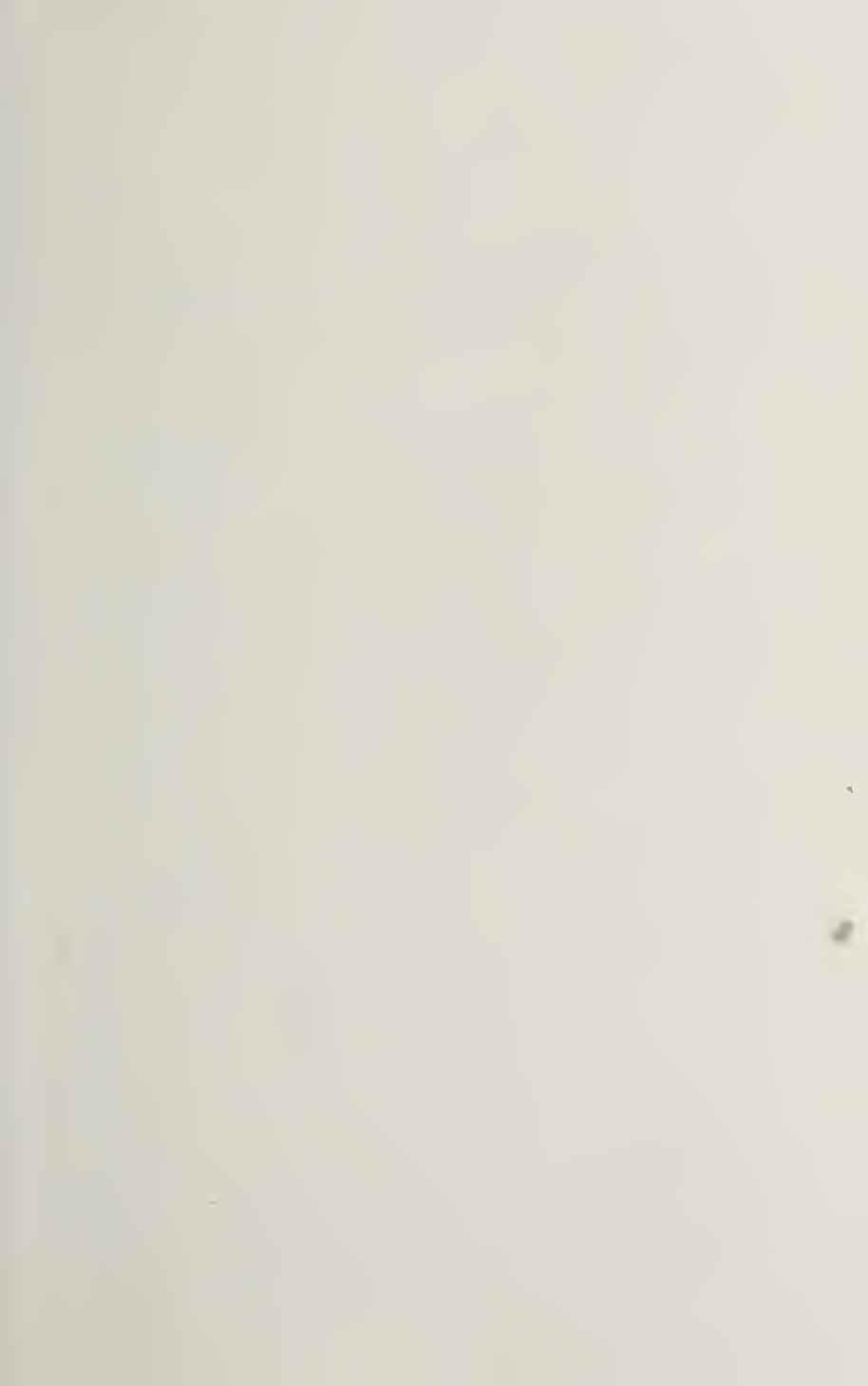
Mr. Blyth's long supplementary Report upon the Society's collection of Australian Vertebrata, exhibited at the meeting, is postponed for the present.



*Meteorological Register kept at the Surveyor General's Office, Calcutta, for the Month of Oct. 1847.*

Days of the Month.	Maximum Pressure observed at 9h 50m.					Minimum Pressure observed at 4 p. m.					Rain Gauges. Elevation. Feet	Moon's phases.		
	Barometer re- duced to 32° Fahr.	Temperature.		Wind.	Aspect of the Sky.	Barometer re- duced to 32° Fahrenheit.	Temperature.		Wind. Direction m. to 4 p. m.	Aspect of the Sky.			Maximum Temperature.	
		Of the Mercur.	Of the Air.				Of the Mercur.	Of the Air.						
1	In. 29.744	77.0	77.0	76.0 E.	Rain.	In. 29.659	79.6	79.5	77.6 E.	Rain.	80.0	1.61	1.66	☾
2	.890	76.5	77.0	76.0 E.	Drizzly.	.806	81.9	81.6	78.0 S. E.	Cloudy.	82.5	..	..	☾
3S	.942	87.5	86.5	81.0 S. E.	Cumuli.	.833	87.4	87.4	76.9 S.	Cumulo strati.	91.0	..	..	☾
4	.946	88.0	86.5	80.4 S.	Ditto.	.814	90.0	88.0	79.0 S.	Cumuli.	91.3	..	..	☾
5	.898	88.0	87.8	81.4 S.	Ditto.	.770	90.4	89.0	78.5 S.	Ditto.	92.0	..	..	☾
6	.883	89.0	88.0	80.0 E.	Cirro cumuli.	.764	85.1	81.5	77.0 E.	Cloudy.	91.8	0.59	0.67	☾
7	.920	76.2	74.8	74.0 E.	Rain.	.779	83.0	82.5	76.2 N. E.	Ditto.	83.0	..	..	☾
8	.937	84.9	85.0	80.8 W.	Cumulo strati.	.828	83.4	83.0	79.0 N. W.	Cirro strati	88.9	0.70	0.77	☾
9	..	..	..	..	....	.801	88.4	87.6	78.4 N. W.	Ditto.	91.7	..	..	☾
10S	.914	87.0	86.5	80.0 N. E.	Cumulo strati.	.839	89.0	87.4	81.9 S. E.	Clear.	91.8	..	..	☾
11	.951	87.0	87.0	79.0 N. E.	Clear.	.852	89.8	88.0	76.2 N.	Ditto.	91.4	..	..	☾
12	.965	88.0	87.0	79.0 S. E.	Cumuli.	.839	89.4	88.0	76.0 N. E.	Cumuli.	91.3	..	..	☾
13	.946	88.0	86.5	78.4 E.	Ditto.	.820	87.5	86.8	76.4 E.	Cloudy.	91.5	..	..	☾
14	..	..	..	..	....	..	..	..	..	..	..	..	..	☾
15	..	..	..	..	....	..	..	..	..	..	..	..	..	☾
16	..	..	..	..	....	..	..	..	..	..	..	..	..	☾
17S	..	..	..	..	....	..	..	..	..	..	..	..	..	☾
18	..	..	..	..	....	..	..	..	..	..	..	..	..	☾
19	..	..	..	..	....	..	..	..	..	..	..	..	..	☾
20	..	..	..	..	....	..	..	..	..	..	..	..	..	☾
21	..	..	..	..	....	..	..	..	..	..	..	..	..	☾
22	..	..	..	..	....	..	..	..	..	..	..	..	..	☾
23	..	..	..	..	....	..	..	..	..	..	..	..	..	☾
24S	..	..	..	..	....	..	..	..	..	..	..	..	..	☾
25	.905	81.1	81.0	73.5 N. W.	Clear.	.784	85.0	83.7	75.0 N. W.	Clear.	86.8	..	..	☾
26	.894	80.8	80.5	76.0 N.	Generally clear.	.773	86.5	85.0	74.0 N.	Ditto.	88.2	..	..	☾
27	.875	84.5	83.6	79.0 N.	Cumuli.	.785	88.5	86.0	75.5 W.	Cumuli.	89.4	..	..	☾
28	.930	85.0	83.5	81.0 N. W.	Clear.	.811	88.8	87.0	77.0 W.	Ditto.	90.4	..	..	☾
29	.946	84.6	84.4	81.0 N. W.	Ditto.	.849	87.0	85.6	73.4 W.	Ditto.	89.8	..	..	☾
30	.990	83.5	84.0	78.4 N.	Cumuli.	.893	86.5	85.0	72.0 N.	Clear.	88.5	..	..	☾
31	.993	85.5	85.0	78.4 N.	Ditto.	.888	87.0	85.0	73.0 N. W.	Cumuli.	89.0	..	..	☾
Mean	29.920	84.3	83.9	78.6		29.809	86.7	85.4	76.6		89.0	5.54	5.86	☾







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